MILL SECTION of Concrete

The Mill Edition of CONCRETE is edited for the manufacturers of portland cement, lime and similar products. Its pages are devoted to discussions of plant design, management, operation, production efficiency, chemical research and control, quarry operation, progress and news of the industry.

The Mill Edition also contains all the material published in the corresponding Regular Edition and so provides news of the uses and merchandising of the materials whose manufacture is discussed in the Mill Edition.

The Regular Section furnishes mill operating officials and mill executives valuable points of contact with the users of the materials they produce.

Volume 30 May, 1927 Number 5

Tests, 1:3 Standard sand

Days:	3	7	14	28	90	180	365
Tensile strength lbs. per sq. in.:	478	581	610	749	697	724	778
Compression lbs. per sq. in.:	5723	7739	8406	9386	10082	10721	12141

This Cement is made in Holderbank, Switzerland. The Plant was completely equipped by Polysius and is famous for efficiency, economy and cleanliness. Wet process, Polysius crushers, Solo Kilns, Solo Mills in operation since 1912.

Polysius Corporation
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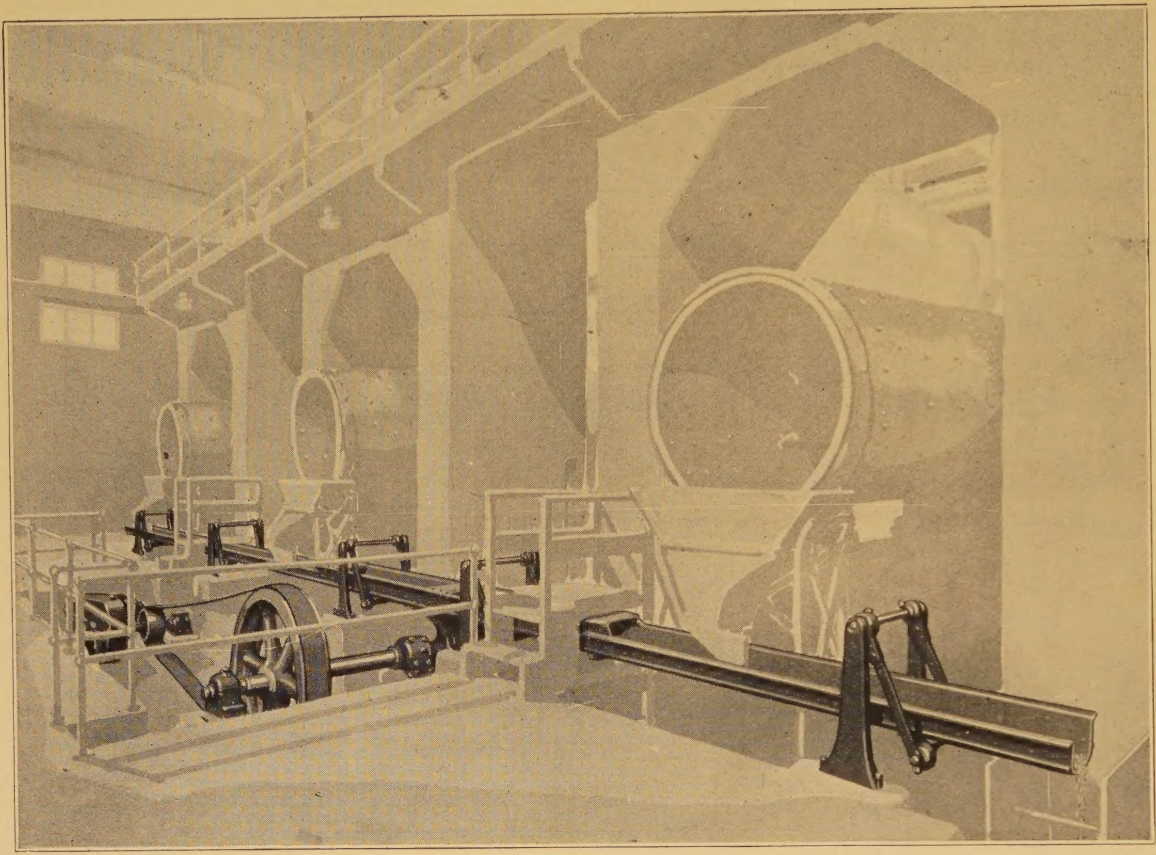
The Skipulter

(Registration Applied for)



A Skipulter installed in a western cement plant, where it is conveying cement clinker, discharged from three coolers, to an elevator

THE Skipulter is an improved type of shaker conveyor for transporting coarse materials, such as cement clinker, coal, ore, slag, rock, limestone, etc.

It consists of a steel trough, suspended by pendulums, actuated through a flywheel and eccentric into an intermittent forward and backward motion. No springs or rollers are employed. The transported material is rapidly and constantly carried forward to point of discharge.

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Designers and Equippers of Cement Making Factories
NEW YORK

Factory, Foundry and Laboratory—Elizabeth, N. J.

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Concrete

Volume 30 May, 1927 Number 5

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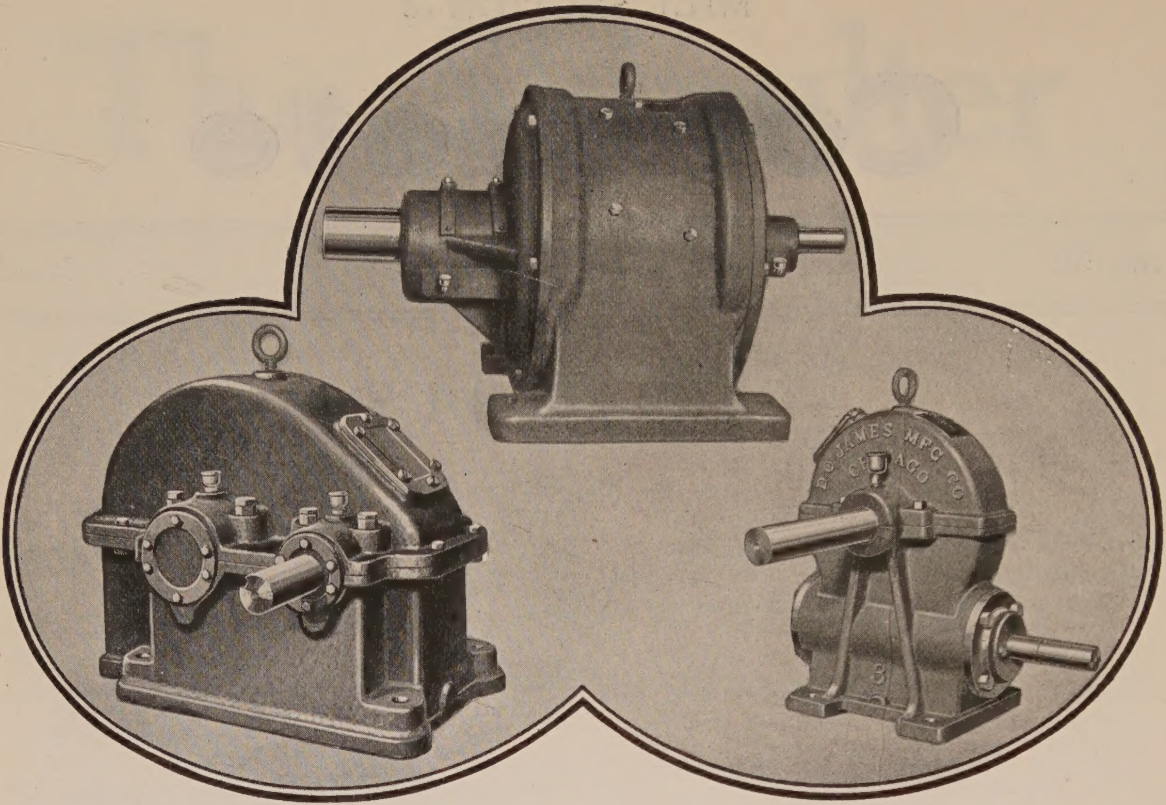

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MILL SECTION of

Concrete

Vol. 30 Chicago, May, 1927 No. 5

New Plant of the Wabash Portland Cement Company at Osborn, Ohio

A Detailed Description of the New Osborn, Ohio, Plant of the Wabash Portland Cement Co.—Layout of Plant — Raw Materials Are Clay and Limestone — Storage Facilities —Preparing Raw Materials—Kilns—Grinding Equipment — Storage — Power Plant—Produces High Early Strength Cement

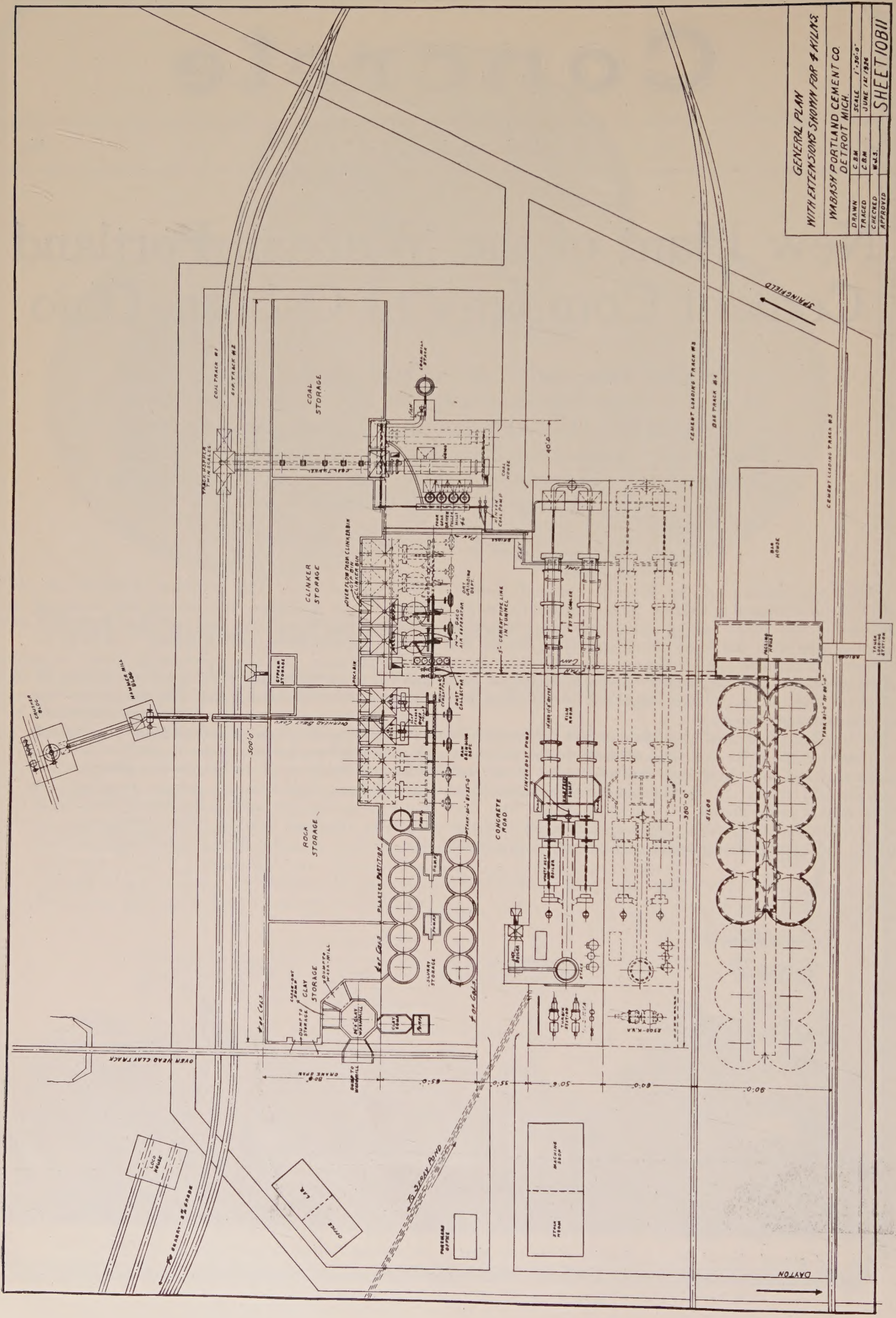
By L. L. STONE

THE new factory of the Wabash Portland Cement Company located at Osborn, Ohio, is another example of one of the older cement manufacturing companies keeping step with the latest developments in the art of cement manufacture. This company was organized about 1900 when the marl deposits in southern Michigan and northern Indiana were being exploited as raw material for cement manufacture.

Its original plant used marl and clay for raw materials and was located at its own town of Stroh in the northeast section of Indiana. In design, that plant was of the wet process and typical of the equipment and construction used at that early period. It was steam driven with line shaft transmission, operating 60-foot kilns, small tube and Griffin mills for grinding and required considerable hand labor for operation. This plant was operated until 1915, when it was discarded as obsolete and worn out and rebuilt about 90 per cent new with equipment and units in keeping with that period.

The company had been considering further expansion and for some years had conducted investigations of other markets and materials together with the proper economic relations that would combine to promise commercial success for a new plant. The result of these efforts was that the Ohio market was decided upon for the new operations and the location at Osborn was selected. This site was made available by the changes resulting from the flood prevention measures undertaken by the city of Dayton after the flood in 1913. That development involved the creation of great flood impounding reservoirs, the

A general view of the east elevation of the new plant of the Wabash Portland Cement Company at Osborn, Ohio


GENERAL PLAN
WITH EXTENSIONS SHOWN FOR 4 KILNS
WABASH PORTLAND CEMENT CO.
DETROIT MICH.
DRAWN C.B.M.
TRACED C.B.M.
CHECKED W.J.S.
APPROVED
SCALE 1"=30'-0"
JUNE 1st 1926
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SPRINGFIELD
DAYTON
COAL STORAGE
COAL TRACK #1
GYP TRACK #2
TRACK HOPPER
COAL TUNNEL
COAL MILL STACK
FAN
COAL HOUSE
FOUR GEAR DRIVEN FULLER MILLS 46"
KINYON COAL PUMP
BRIDGE
ELEV
40'-0"
CLINKER STORAGE
OVERFLOW FROM CLINKER BIN
GYP BIN
CLINKER BIN
GYPSUM STORAGE
ROCK BIN
OVERHEAD BELT CONV
DRY GRINDING DEPT.
14'-0" GACO AIR SEPARATOR
DUST COLLECTOR
KINYON CEMENT PUMP
RAW GRINDING DEPT.
5" CEMENT PIPE LINE IN TUNNEL
HAMMER MILL BLDG.
CRUSHER BLDG.
500'-0"
ROCK STORAGE
PLASTER PARTITION
PUMP
TANK 30'-0" BY 35'-0"
SLURRY STORAGE
CONCRETE ROAD
KINYON DUST PUMP
WASTE HEAT BOILER
AUX. BOILER
STACK
TURBINE STATION
2500 K.V.A.
KILN ROOM
8' BY 12' COOLER
10' AND 11'-6" DIA
CEMENT LOADING TRACK #3
BAG TRACK #4
CEMENT LOADING TRACK #5
BAG HOUSE
PACKING HOUSE
TRUCK LOADING STATION
SILOS
TANK 30'-0" BY 80'-0"
380'-0"
CLAY STORAGE
DUMP TO STORAGE
DUMP TO WASH MILL
CLAY CAR
DUMP TO WASHMILL
CRANE SPAN 80'-0"
4 OF CELLS
OVERHEAD CLAY TRACK
65'-0"
55'-0"
50'-6"
60'-0"
80'-0"
TO SPRAY POND
LOCO HOUSE
TO QUARRY 6% GRADE
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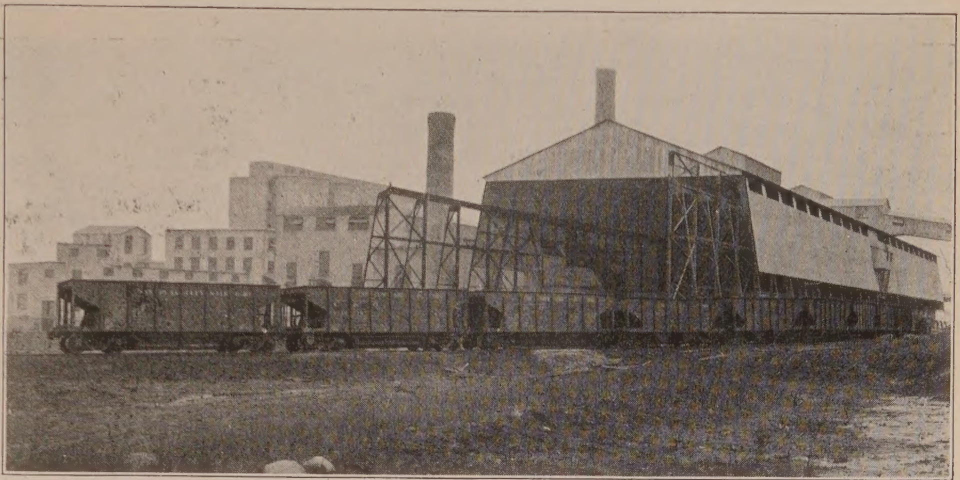
OFFICE
MACHINE SHOP
STOCK ROOM
PORTERS OFFICE

largest of which was on the Mad River and required the removal of the original town of Osborn to higher ground. The removal of the Erie and Big Four railroads serving that town to the new location tapped the limestone deposits lying undeveloped in that vicinity.

After drilling and testing the rock and finding same of excellent quality for cement making material, the Wabash company acquired the ownership of the major portion of the entire supply of available limestone in that district. Plans were prepared, and construction started on the new plant in the spring of 1925. The mill was completed the following winter and its product came on the market in the early part of 1926.



The materials storage building

General Description

In design, the wet process as applied to hard materials was adopted and the plant layout is shown in an accompanying illustration. Provision was made for future enlargement and much of the building and storage necessary for that purpose was provided.

Raw Materials

The limestone properties of the company consist of an area of several hundred acres, part of which is covered with several feet of clay overburden. The plant was located and the quarry opened in a section where the clay stripping was in approximately the correct amount to mix with the limestone beneath. The quarry is located about 1500 feet from the crushing plant which was so placed that the top of the crusher is on a level with the quarry floor, subject to minor grades introduced to facilitate handling of the quarry cars.

General view of the plant

The clay is excavated by a Marion full-revolving steam shovel mounted on caterpillar treads and equipped with a 1¼ cu. yd. dipper. It is loaded into standard gauge side dump Koppel cars and switched to the plant by 25-ton American steam locomotives.

After the clay covering is removed the rock is drilled by electrically-operated Loomis well drills, drilling 5¼-inch holes. The rock is loaded by a 70-ton Marion steam-driven shovel mounted on caterpillar treads and equipped with a 2½ cu. yd. bucket, onto standard gauge side-hinged Koppel rock cars of 9 cu. yds. capacity. The loaded cars are switched to the crushing plant also by 25-ton steam locomotives. Due to the stratification of the rock and the size of the primary crusher, very little secondary shooting of the rock is necessary. For this purpose an electrically-driven air compressor and Hardsocg hand drilling equipment is used.

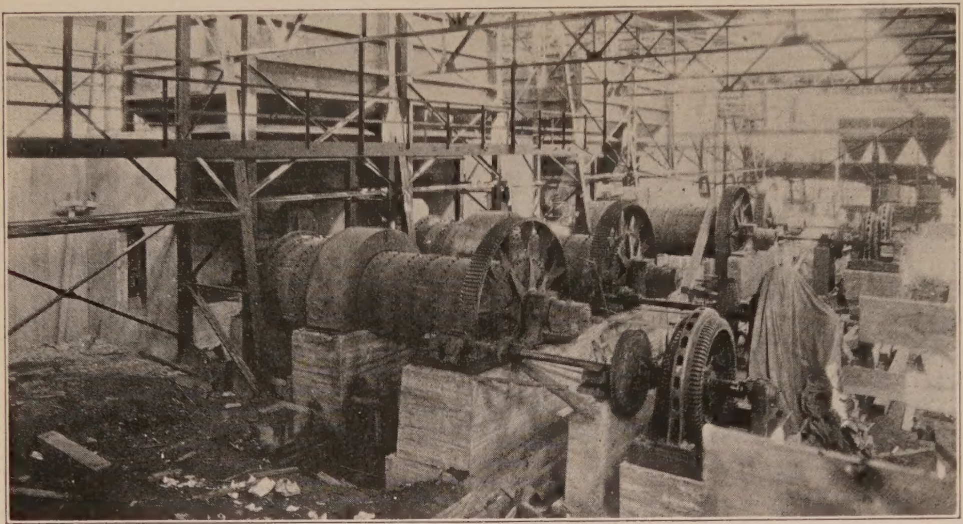
When delivered to the crushing plant a train of loaded cars is placed on a track back of the crusher. A combined car puller and dumping device spots the cars in turn at the crusher. After dumping, the empty cars are switched by gravity onto a storage track where the train of empty cars is ready for return to the quarry when the next train of loaded cars arrives.

The crushing plant is equipped with a 42-inch Allis-Chalmers gyratory crusher driven by a 200-h.p. slip ring motor. This size of crusher was selected to aid quarrying operations and provide capacity for future enlargement of the plant. The rock from the crusher is delivered onto a 36-inch wide steel apron conveyor leading to a feed bin over a secondary crusher. This conveyor as well as all elevating equipment in the plant was furnished and erected by the Webster Manufacturing Company and all are driven by direct connected motors through Falk Company herringbone gear reducers. The secondary crusher is a hammer mill pulverizer furnished by the Dixie Machinery Company and driven by a direct connected 150-h.p. slip ring motor. This pulverizer reduces the rock to 1¼ inch and smaller and delivers into a 24-inch belt conveyor leading to the mill buildings.

Materials Storage

In general, the design of the plant arrangement is closely related to a single storage building in such a manner that a duplicate conveying system is available to all operating departments. This storage building is 500 feet long and 80 feet wide. The superstructure is of structural steel, covered on roof and sides with galvanized Armco iron. The storage walls are of reinforced concrete with concrete partition walls dividing the storage into sections. One section is for clay storage having a capacity for producing 120,000 bbls. of cement. A second section for crushed rock has a capacity for 75,000 bbls. A third section stores 75,000 bbls. of clinker. The last section can store several thousand tons of coal. The entire building is served by a girder crane with $2\frac{1}{2}$-cu. yd. clamshell bucket. This crane was furnished and erected by the Cleveland Crane and Engineering Co.

The cars of clay from the quarry are received on a trestle at one end of the clay storage in which is installed a 26-foot Allis-Chalmers wash mill. This mill is so arranged that clay can be dumped from the cars either into the wash mill direct or into storage and later reclaimed by the overhead crane and fed to the wash mill. After being washed the fine clay is delivered to a sump in the raw grind department and the coarse residue is periodically dumped through the bottom of the mill into a concrete sump. This sump is cleaned out by the crane which delivers the contents into cars for removal. This installation washes and separates all clay before delivery to the raw grind department. The washed clay is stored in two concrete silos 10 feet in diameter by 35 feet high.



The raw and finish grind department

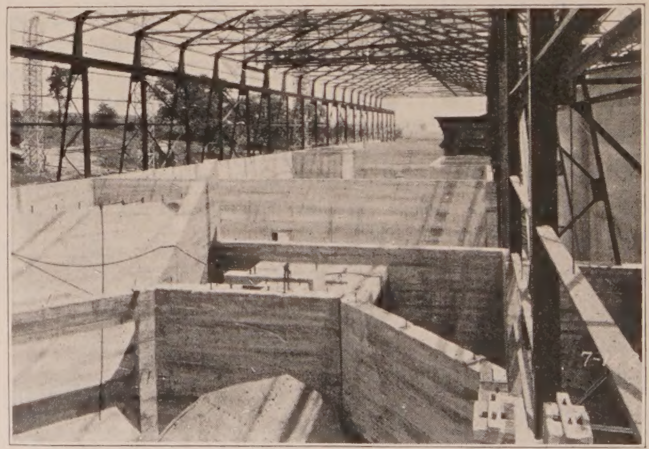
Raw Grinding

The crushed rock is delivered from the crusher house conveyor either direct to the bins over the raw grinding mills or to storage for reclaiming later by the crane for delivery to the mills. In the raw grind department are two Allis-Chalmers compeb mills having two diameters of 8 feet and 7 feet and a length of 24 feet each, driven by an Allis-Chalmers 500-h.p. synchronous motor direct connected through a Cutler-Hammer magnetic clutch. Over each mill is a bin of 1,000 bbls. capacity connected to a 36-inch table feeder on each mill. The clay is fed to each mill by individual specially designed feeders which give a wide range and very minute and continuous control of the raw mix. Correction of the raw mix after grinding was very rarely required even during the opening of the quarry, when the amount of clay required varied from zero to the full amount necessary to proportion pure limestone. From the grinding mills the slurry is delivered by a 16-inch screw conveyor to one of a pair of 4-inch Wilfley pumps. All washed clay and slurry in the various stages is handled by these pumps which are installed in duplicate at each location. The slurry is stored in eight concrete silos 19 feet in diameter by 40 feet high, so arranged that they can be used for correction or blending tanks in any combination or entirely as storage tanks. All clay and slurry tanks are equipped with both air and mechanical agitation.

Kilns

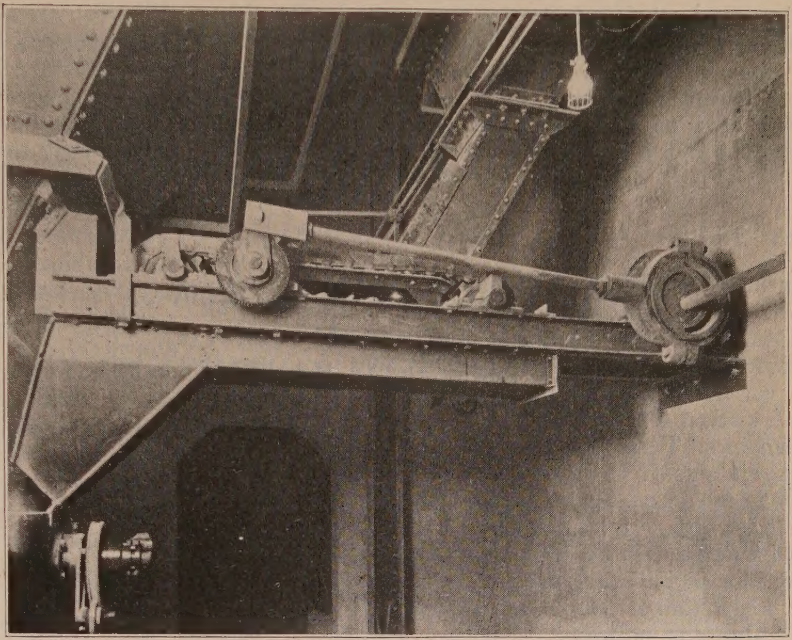
In the burning department are two Allis-Chalmers kilns proportioned for waste heat installation, 11 feet 3 inches and 10 feet in diameter by 175 feet long. Under each kiln is a rotary cooler 8 feet in diameter by 72 feet long. Each kiln is driven by a 60-h.p.. variable speed motor through Link-Belt Company silent chain drives. About ninety feet of the central portion of the kilns are lined with Silocel brick back of the fire brick lining. The slurry is delivered to the kiln feeders by Wilfley pumps.

The feeders are driven from the kiln mechanism to maintain a constant relation between slurry feed and kiln speed. The clinker from the kilns can be delivered either into the coolers or directly to a hot clinker drag conveyor system discharging into the clinker storage for cooling by radiation and later reclaiming by the storage crane to the grinding mills.



The interior of the storage building during construction

Except in case of repairs the clinker passes through the coolers onto an 18-inch steel apron conveyor from which it is elevated to a Merrick weightometer in the finish grinding department. After weighing it is delivered either direct to the grinding mills or to storage. Coal is fed to the kiln burners by Fuller Lehigh 6-inch duplex motor driven coal feeders so arranged that either one or both screws can operate a kiln. Air for the coal blast is furnished by one of a duplicate set of Clarage fans, each driven by a 50-h.p. direct connected motor. These fans handle preheated air drawn from a hood over the upper end of the coolers.



An apron feeder of the ratchet type, feeding gypsum to the finish grinding mill

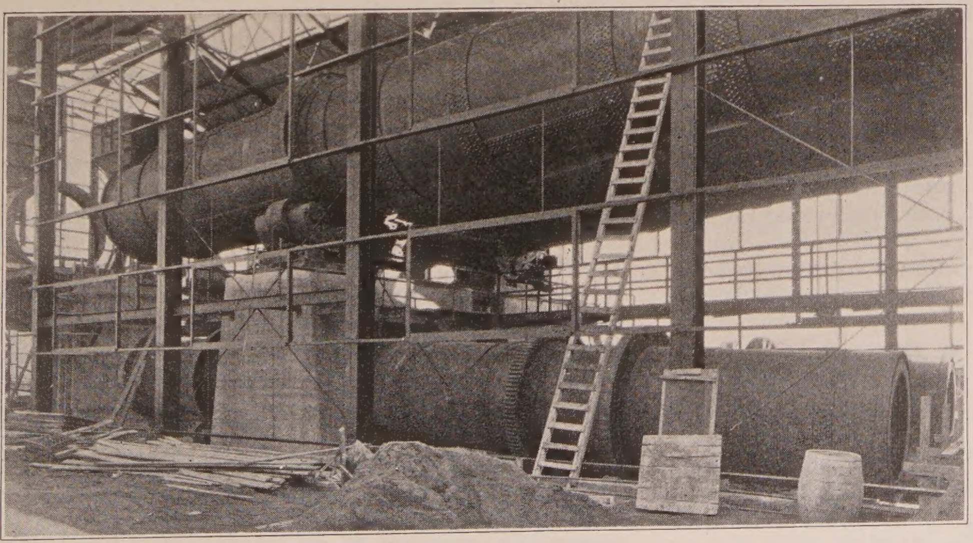
Coal Department

Coal is received at the rate of 60 tons per hour through a track hopper and regulated by a feeder onto a 24-inch belt conveyor discharging by a vertical enclosed elevator either direct to the coal dryer or to coal storage. The track hopper is placed in the center of a Fairbanks track scale. This arrangement allows loaded coal cars to be dropped from the gravity storage track onto the scale, weighed, dumped, and the empty cars weighed before shunting onto the gravity empty car truck.

The belt conveyor from the track hopper passes through a tunnel under the coal storage. Suitable gates and spouts in the tunnel roof allow the coal in storage to be reclaimed also by the conveyor and elevator in addition to the crane. The coal is dried by a 6-foot diameter by 60-foot Allis-Chalmers rotary dryer fired either by hand or pulverized coal. From the dryer the coal is passed over a magnet and elevated to two Fuller Lehigh 46-inch mills direct connected to 100-h.p. slip ring motors. The pulverized coal is conveyed to a 6-inch Fuller Kinyon pump discharging through a 5-inch pipe line to the bins in the kiln department. The coal department is kept free from dust by an induced draft system consisting of a direct connected fan exhausting from all dryer, elevator and conveyor vents through a self-cleaning concrete and dust settling chamber and discharging into an 8-foot by 80-foot concrete stack delivering the gases above the roof lines.

Finish Grinding

The finish grinding units consist of two Allis-Chalmers compeb mills 8 feet and 7 feet in diameter by 24 feet long, each driven by a 500-h.p. synchronous motor through



Installing the coolers under the kilns

a Cutler-Hammer magnetic clutch. These mills are equipped with an external screening device between the ball and finish grind compartments. The material passing through the circumferential screen feeds to the fine grind compartment and the tailings return to the ball section.

Each mill is also equipped with a 14-foot diameter Gayco air separator operating in a closed circuit with the fine grind section of the mill. The finish grinding department is also equipped with a continuous air filter furnished and erected by the Northern Blower Company, who also furnished all dust collecting apparatus in the plant. This filter is connected to vents tapping the elevator heads, screw conveyor and to three points on each mill. The finished cement is delivered by a 16-inch screw conveyor to either of a pair of 6-inch Fuller-Kinyon pumps discharging through a 5-inch pipe line to the cement storage silos.

Cement Storage

Cement is stored in a stock house consisting of ten 31-foot by 80-foot concrete silos arranged in two rows of five silos, which with interstices gives a storage capacity of 175,000 bbls. Under each row of tanks is a tunnel which carries a 16-inch conveyor delivering to one of a pair of vertical elevators feeding the bins over the packing machines. These bins are equipped with the Fuller-Kinyon bin signals for convenience in controlling flow of cement to the bins. In the main packing room, which is four stories high, are four three-tube Bates packers. Each pair of packers delivers by a belt conveyor to cars on a gravity operated loading rack on each side of the pack house. Each pair of packers are vented to an intermittent type Norblo dust collector.

An auxiliary packing department is also provided for truck and arranged for convenient enlargement. Sacks are received in a two-story and basement, concrete and steel, building equipped with an Otis platform elevator. The sacks are cleaned by a continuous bag cleaner built by the Bethlehem Foundry and Machine Company. This cleaner is also equipped with a Norblo dust collector.

Power Plant

The waste heat power plant provides steam from cross drum boilers individually connected to each kiln, with a by-pass flue direct to a 12-foot by 180-foot concrete stack built by the Rust Engineering Company. Each boiler is baffled for four passes and has 9080 sq. ft. heating surface and designed for 200 lbs. per sq. in. working pressure. Foster superheaters provide 100 deg. F. superheat. Each boiler also has a Foster economizer of 3400 sq. ft. heating surface.

The superheaters are placed at the top of the first pass and the economizers directly beneath the last pass. Draft is induced by direct connected Clarage fans, each driven by a 100-h.p. slip ring motor and discharging into the concrete chimney. Beneath each entire boiler and fan unit in a 10-foot basement is a row of suspended hoppers receiving all flue dust which is collected by a 9-inch screw conveyor and delivered to a bin over the slurry feeders by a 4-inch Fuller Lehigh pump.

There is also provided one auxiliary three-pass cross drum boiler having 3510 sq. ft. heating surface with Foster superheater giving 100 deg. F. superheat. This boiler is fitted with an automatically controlled heavy duty Type E stoker, furnished by the Combustion Engineering Company, having a capacity for 200 per cent boiler rating. Air for operating the stoker is furnished by a Clarage steam driven stoker fan.

The gas flues and boiler settings are part reinforced concrete and part brick carried on structural steel framework. All flues up to the second pass of the waste heat boilers are lined with Silocel brick back of 9 inches of fire brick. The boilers, superheaters, economizers, fans and settings were furnished and erected by the Wickes Boiler Company.

The turbine room is equipped with two turbines built by the Allis-Chalmers Company, who also furnished the condensers and all plant motors. The turbines operate at 180 lbs. per sq. in. working pressure and 100 deg. F. superheat and have a capacity of 1250 kw. at 80 per cent power factor. Current is generated at 2300 volts, 60-cycle, 3-phase, and distributed through the plant in metal conduits. All motors above 75 h.p. are 2200-volt, with department transformers furnishing 440 volts to smaller motors. Generator excitation is furnished by direct connected exciters and duplicate motor generator sets.

All power house auxiliaries are motor driven and the heat balance secured by bleeding the turbines to a deaerating heater. Each turbine is connected to a surface condenser fitted with two-stage air evactors and proportioned to give 27½-inch vacuum with 85 deg. F. inlet water temperature. Provision is made for adding additional condensing surface if desired. The circulating water is cooled by a spray pond equipped with Klein nozzles by Yarnall-Waring Company.

There is also provided a small non-condensing Kerr turbine driving a 2300-volt, 3-phase, 60-cycle generator for use in starting the plant and furnish lights and small power requirements when the plant may be shut down for repairs. Feeder water is fed to the boilers by 3600-r.p.m. direct connected motor driven Allis-Chalmers boiler feed pumps controlled by Copes feed water regulators. Makeup water for the boilers is furnished by Griscom-Russell evaporators. The surplus evaporated water is stored in a 50,000-gal. water tower built by the Pittsburgh-Des Moines Steel Company.

Plant Buildings

The main plant buildings are made of structural steel with cement tile roofs and stucco side walls. All structural steel was furnished and erected by the Indiana Bridge Company. The cement tile was erected by the Federal Cement Tile Co. The steel sash and glazing was furnished by the Bayley Steel Products Company. All concrete walls, foundations, slurry tanks and cement storage silos were built by the Spencer Construction Company, the eastern division of the Macdonald Engineering Co.

The plant has been in continued operation since beginning operations and has produced an unusually uniform cement of an extraordinarily high quality. The new product has been well received by the trade and was placed on the market with a minimum of expense. The cement is of the early hardening class and some remarkable construction records have been made in the extensive building operations where it has been used.

The plant is owned and operated by the Wabash Portland Cement Company, whose main offices are in Detroit, Michigan. The president of the company is Mr. Emil Stroh and secretary is Mr. H. F. Jennings.

The new plant in Osborn as well as the rebuilt plant at Stroh, Indiana, were designed and built under the direction of Mr. L. L. Stone, Morgan Building, Detroit, Michigan. Mr. W. J. Swegman was chief assistant in charge of drafting room and field work.

Power Plant and Kiln Design and Operation

A Series of Articles on the Combined Processes of Power Plant and Kiln Operation Considered as a Unit

By R. R. COGHLAN
Chemical Engineer
AND
T. H. ARNOLD
Electrical Engineer, Southwestern Portland Cement Company, Osborn, Ohio

Chapter VIII—Thermal Losses in Kilns

Thermal Losses from Incorrect Ratio of Air to Fuel—Classification of Losses—Losses Resulting from a Deficiency of Air—From Incomplete Mixture of Air and Fuel—From the Reduction in the Flame Temperature—From Excess Air—From Unconsumed Combustible—Conclusion

INCORRECT adjustment of the air fuel ratio and the incomplete admixture of these elements form one of the most common and least appreciated losses in the rotary kiln. Unless gas analyses are taken at frequent intervals and corresponding adjustment of fuel and air made to give efficient combustion, the losses existing will be surprisingly large. Such losses are unsuspected until revealed by the gas analysis. Even when the gas analysis shows such conditions as actually existing, many operators do not appreciate the magnitude of the thermal losses and their value in dollars and cents.

Combustion engineers have revolutionized modern boiler practice by careful engineering studies of the various means of obtaining and maintaining at all times a proper admixture of fuel and air to procure perfect combustion of the fuel with a minimum of excess air. While fuel efficiency and dollar efficiency are not exactly synonomous, an improvement in fuel efficiency must be accompanied by a reduction in fuel costs. Unless the saving in fuel is sufficient to counteract the increased cost of obtaining the saving there is no advantage in making such saving. Fuel savings resulting from careful investigation of these conditions will usually be of a magnitude which cannot be overlooked on the cost sheet.

The ease with which improper combustion may be detected and remedied render this form of loss rather inexcusable. There is no real reason why the operating department should not be held accountable for the heat units used through the plant in the same manner as the accounting department is held responsible for the money used in the operations. Heat units represent a large portion of the money spent for manufacturing the cement. When the cement plant executives follow the example of the power company executives and demand an accounting for the disposition of the heat from the fuel used, we will find a different attitude adopted toward the fuel situation. We can then expect real progress in reduction of the fuel cost and an increase in fuel efficiency corresponding to that accomplished in boiler practice in the past few years.

The peculiar feature of the situation is that much of this may be accomplished with the existing equipment. The greater portion of the really necessary expenditures will be in the technical study and the small outlay for changing the equipment will be rapidly repaid by the additional output which invariably follows proper adjustment of the air fuel ratio.

Classification of Losses

The losses due to incorrect air fuel ratio may be divided into three general classes, those due to a deficiency of air, those due to an excess of air, and those due to the incomplete mixing of the fuel and the air. Several of these losses may exist simultaneously and the conditions may gradually fluctuate from one to another. Thus a few isolated gas analyses do not mean anything. A constant study will be necessary until conditions have been stabilized.

An incorrect air fuel ratio results in direct heat losses from reduced flame temperature, unburned fuel, or heat carried out with the flue gases. Indirect heat losses result from reduced kiln capacity, from the additional power required for handling the gases through the kilns, flues and boilers. There is an additional loss where waste heat boilers follow the kilns in the reduced heat available in the gases owing to the difference between the available heat in the carbon dioxide as compared with the available heat in air with a similar temperature range between the kiln exit gas and the economizer exit gas.

A classification of the principal losses to be anticipated may thus be classified as follows:

Losses Resulting from a Deficiency of Air

Loss from unconsumed fuel carried out with the exit gases.

Loss from partially burned fuel as carbon monoxide.

Loss from reduced flame temperature.

Losses Resulting from an Excess of Air

Loss from reduced flame temperature.

Loss from heating the excess air to the temperature of the exit gases.

Loss from increased exit gas temperatures owing to the lower heat transmission by radiation in the hot zones.

Loss from difference in the specific heat of the gases at the various temperatures.

Loss from reduced capacity owing to the increased velocity of the gases in the burning zone.

Loss from additional power required for the draft to remove the gases throughout their travel.

Loss from additional capital required for larger gas passages, fans, etc.

Losses Resulting from Incomplete Mixture of Air and Fuel

Loss from unconsumed fuel carried out with the exit gases.

Loss from partially burned fuel as carbon dioxide.

Loss from unconsumed air passing through the hot zone.

Loss from reduced flame temperature.

Losses from the Reduction in the Flame Temperature

It will be noted that all the incorrect relations of the air and fuel will result in a lower flame temperature. The heat transfer rate in the burning zone was discussed at some length in Chapter V. It was shown that the heat transfer rate in the hot zone will largely determine the fuel efficiency of the kiln. The heat transfer rate will follow the Stefan Boltzmann Law and will vary with the fourth power of the absolute temperatures of the flame and the material. In a flame there appears to be another variable, the exact effect of which has not been accurately determined. It has been shown that with a gas or oil flame a luminous flame will radiate a larger portion of the heat than will a non-luminous flame burning the same gas. Some recent results in experiments along this line with a review of the literature is given in the article "Radiation from Luminous Flames," by Haslam and Boyer, in *Industrial and Engineering Chemistry*, January, 1927.

From the available data we may presume that the heat is radiated from the surface of the incandescent carbon particles floating in the flame. Thus if the flame is of sufficient depth and has sufficient particles to present the appearance of a solid body, the radiation owing to luminosity will be a maximum. Anything which will increase the luminosity of the flame will increase the heat transmission by radiation, and vice versa.

Preheating the air for combustion has a peculiar effect in that it reduces the heat transfer by radiation and defeats the very purpose of heat conservation in some cases. If the luminosity of the flame depends upon the carbon particles, the effect of preheating the air will be to reduce the time of the chemical action of combustion and thus the time during which the individual carbon particle will remain floating in the flame before it is consumed. This reduces the density of the flame and has the effect of decreasing the length and luminosity of the flame and thus the amount of heat which will be radiated in a given time. The heat which is not radiated will largely be carried out of the kiln with the gases and will do no useful work unless recovered in the boilers. This will account for some experiments which did not show the expected fuel saving from preheating the air for combustion.

Ash Content

The luminosity of the flame may be increased with the preheated air if some element beside the carbon of the fuel is used to bring up the content of incandescent particles floating in the flame. It has been noted that a high ash percentage has the effect of increasing the luminosity of the flame and thus the heat transmission by radiation. In some experiments with coal varying in ash it was noted that the coal per barrel did not increase with the ash content. In fact a slight decrease was noted. The B.t.u. per barrel actually decreased as the ash content increased. There is probably a limit beyond which the ash content will reduce the flame temperature, but long before this is reached the effect of the ash contamination will cause difficulties with the quality of the clinker produced. Apparently the economic limit will lie somewhere in the neighborhood of 20 to 25 per cent ash in the coal as fired.

These high ash coals are more readily burned completely with a low percentage of excess air and thus with higher flame temperatures. This is probably due to the fact that the adulteration of the carbon by the ash in the individual particles gives finer separation of the carbon and allows a more intimate mixture of the air and carbon.

A very complete discussion of the effect of the air fuel ratio on the flame temperature may be found in the paper by Bailey (Limiting Factors in Reducing Excess Air in Boiler Furnaces) in *Mechanical Engineering*, July, 1926.

The usual effect upon the operator when low flame temperature is encountered is to endeavor to burn more fuel. Frequently a point is reached where the endeavor is made to burn more than the volume of the combustion space will allow, thus only aggravating the trouble. A check of the gas analysis would quickly show the real trouble and suggest the true remedy.

An additional heat loss resulting from this reduced temperature lies in the fact that if the heat is not transferred to the lining or the material in the kiln, it will be carried out with the exit gases. Thus the low flame temperature may be accompanied by high exit temperature.

Losses from Excess Air

The air used for combustion, not being visible and apparently costing nothing, is actually a rather expensive and necessary element of combustion. Few operators appreciate that the weight of air necessary for the combustion of the fuel is greater than the weight of the raw material used in the manufacture of the cement.

While the air itself costs nothing, we must pay a high price for using this air in the combustion of the fuel. This cost is paid in heat units for raising the air temperature and in power for transporting the air through the gas passages. The total of these costs exceeds the labor and supply costs but because little effort is made to segregate this item, its magnitude is seldom appreciated. A portion of this cost is a proper cost incident to the combustion and cannot be avoided. That portion of the cost which applies to the excess air which passes through the burning zone without entering into the combustion, forms one of the largest controllable losses and should be carefully watched.

Any air present in the gases in excess of the air necessary to furnish the oxygen for complete combustion of the fuel will be responsible for other losses than those resulting from the lowering of the flame temperature. The temperature of this excess air must be raised from that of the atmosphere to that of the other gases. While some of this heat will be transmitted to the material, the air leaving the kiln will carry with it the heat corresponding to the difference in temperature of the entering air and that of the exit gases. This air does no useful work. It absorbs heat which would otherwise be used in the process.

The velocity of the gases through the burning zone will be increased in proportion to the amount of excess air.

There is a very definite but little understood relationship between the gas velocity in the burning zone and the clinker output and fuel economy of the kiln. This relationship will be discussed in a later article. Suffice to say that the efficient operating range is rather small and beyond this the increase in clinker is slight in proportion to the fuel increase.

The additional volume and weight of the excess air will require additional draft to draw the increased amount of gas through the gas passages. Thus additional fan and motor capacity may be required. It is very easy to double the load on the fan motor by means of the excess air. This air may be admitted through the kilns or by air infiltration in the flues or boilers.

Cases have been known where the fans and motors have been increased in capacity to provide adequate draft where the real remedy should have been the reduction of the gas quantity by the elimination of the excess air.

The gas friction on the walls will vary with the square of the velocity. The velocity will vary directly as the volume of the gas. The induced air will expand as it is heated. Thus the admission of a comparatively small amount of cold air may have a large effect on the draft and thus on the power required to move the gases.

Loss from Unconsumed Combustible

In comparison with the boiler furnace, the rotary kiln offers much better conditions for the complete combustion of pulverized coal with a minimum of excess air. In this respect the long combustion space, with incandescent refractory linings to radiate the heat for ignition reproduce practically all the requirements for ideal conditions for the combustion of this class of fuel. The long travel insures the intimate mixture of the air with the fuel particles and allows ample time for the reactions of combustion. The initial turbulence of the primary air and coal combined with the enveloping effect of the secondary air and the rotary action of the kiln should allow ample opportunity for each particle of combustible to come in intimate contact with the necessary oxygen for combustion without providing a large surplus.

Several conditions militate against perfect combustion, however. Those coal particles which are ground too coarse to remain in suspension in the flame can be observed to drop out in the cooling zone and will burn at the nose of the kiln or in the clinker chute. In either case the heat will not be utilized efficiently.

If the gas velocity is too high, some of the partially burned particles of combustible will be drawn through the kiln before combustion is complete. These particles are frequently found in the dust in the flues and at times may be observed in the form of a dark smoke in the gases leaving the chimney. Examined under a glass some of these particles show similar construction to the original coal while some show a structure similar to a coke particle. There is good evidence that under some conditions an appreciable proportion of the coal passes through the kiln without even giving off its volatile matter. This does not seem so impossible when the velocities of the gases are considered. In some kiln tests the velocity of the gases through the kiln vary from 20 to 80 feet per second at different points.

Carbon particles deposited in the dust at times burn in the flues with the oxygen in the gases enriched by the air infiltration. This does no particular harm unless the dust particles reach a large proportion of the dust collected, in which case several difficulties present themselves. Where a large amount of fuel is carried in the gases an explosive condition may exist which will be dangerous to the flues and setting.

It is extremely difficult to form an accurate estimate of the amount of unconsumed combustible carried over in this manner. Mr. Bailey in his paper ("Limiting Factors in Reducing Excess Air in Boiler Furnaces") has developed a method for determining this unconsumed carbon in a boiler furnace fired by pulverized coal. He uses the gas analysis and the ultimate analysis of the coal with the hydrogen carbon ratio. This method requires extremely accurate gas analysis. While careful work will give accurate results by this method in boiler work, it can only be handled by a person well versed in combustion.

In the rotary kiln several other factors are involved which render the problem more difficult. The gases are enriched by the carbon dioxide from the raw mix and the water vapor from the slurry. The chances for error are thus multiplied, and it is unlikely that conclusive results can be obtained practically in this manner.

There is no satisfactory method for making a chemical separation of the dust and the unconsumed fuel owing to the carbon dioxide remaining in the partially burned raw dust. The accurate determination of this loss may thus be classed as among the unsolved problems.

Incomplete combustion from a deficiency of air is usually evidenced by an appreciable percentage of carbon monoxide. This represents a direct loss in the heat released during combustion. The combustion of one pound of carbon burned to carbon dioxide releases 14,540 B.t.u. whereas the same carbon burned to carbon monoxide releases only 4380 B.t.u. It is obvious that this difference can only result in the combustion of additional fuel to make up the deficiency in the available heat.

Losses Due to the Incorrect Admixture of Air and Fuel

It is obviously impossible to furnish exactly enough oxygen to properly burn the fuel fed and to maintain these conditions. In the latter stages of the combustion chamber the volume of the gases formed is very large, and the amount of carbon and unconsumed oxygen very small. To insure that all the carbon will come in intimate contact with its quota of oxygen it will be necessary to have a slight excess of air. Generally this may be accomplished with the presence of from 0.5 to 1.0 per cent of oxygen in the exit gases. Considerable turbulence in the gases will be necessary to insure these results.

It is entirely possible to have gas analyses which show carbon monoxide and oxygen together. Such analyses clearly show a lack of proper admixture of the air and fuel and may show some stratification of the gases. This may be accompanied by high gas velocity in the kiln and a consequent drawing over of unconsumed carbon particles.

Conclusion

In conclusion, the proper quantity relationship between the fuel and air is very important. Incorrect adjustment of this ratio may readily cause an unsuspected loss of several pounds of coal per barrel of clinker burned. The various elementary conditions entering into this relationship are so different for each installation and fuel that a comparison of conditions at various plants may be deceptive. These conditions must be studied individually at each plant and a separate solution worked out for the particular fuel, raw material and equipment to allow proper burning with a minimum fuel cost.

(Continued on page 111)

Safety Meetings Successful at Birmingham and LaSalle

Regional Meetings Show Increased Interest in the Promotion of Safety in Mills and Quarries

TWO regional meetings of unusual significance to cement manufacturers and cement mill operating forces were held during March at Birmingham, Alabama, and LaSalle, Illinois, in the interest of mill and quarry safety.

The Birmingham meeting, to which were invited representatives of all cement mills in Alabama, Georgia and Tennessee, was the first of its kind held in the South and the first of half a dozen or more to be held during this year in various parts of the country. It took place in Hotel Tutwiler on March 15. An attendance of 86 was recorded, which included 3 cement company executives, 8 superintendents, 37 foremen and department heads and 19 mill and quarry workmen. There were also present safety experts representing the U. S. Bureau of Mines, National Safety Council, Alabama Power Company, DuPont and Grasselli powder interests and the Birmingham Safety Council. The meeting was held under the auspices of the Portland Cement Association and the National Safety Council.

R. H. MacFetridge, superintendent of the Lehigh Portland Cement Company's Birmingham plant, acted as chairman, and Mr. MacFetridge, with R. H. Nicholson, vice-president of the National Cement Company and J. W. Johnston, vice-president of the Alabama Portland Cement Company, acted as committee of arrangements. At the opening session, A. J. R. Curtis, Assistant to the General Manager of the Portland Cement Association, gave out a preliminary tabulation of accident statistics for 1926, shown below, with comparative figures for every year since 1919. Although man hours worked have doubled, and production has much more than doubled, the annual number of accidents has decreased. There were actually fewer accidents in the 123 plants reporting in 1926 than there were in the 67 plants reporting in 1919.

Shaffer Method Demonstration

The Shaffer "Prone Pressure" method of artificial respiration was splendidly explained and demonstrated by a first aid team of the Alabama Power Company and papers were read by DuPont and Grasselli engineers stressing the careful handling and use of explosives used in cement quarry work. Addresses were also made by T. G. Brabston, President of the Birmingham Safety Council, whose witty and trite anecdotes made excellent safety lessons; and by W. E. Saxon, of the U. S. Bureau of Mines and H. G. Jacobsen, of the Bates Valve Bag Co. Five-minute talks on safety subjects were made by the following: D. L. Hopkins, Clinchfield Plant, Penn-Dixie Portland Cement Co.; Joe Uhlman, Richard City Plant, Penn-Dixie Portland Cement Co.; R. L. Sullivan, Signal Mountain Portland Cement Co.; W. L. Drake, Hermitage Portland Cement Co.; R. R. Webb, National Portland Cement Co.; J. C. Giles, Lehigh Portland Cement Co.; B. E. Merrell, Atlas Portland Cement Co.; W. M. Cabaniss, Alabama Portland Cement Co.; Wm. Moeller, International Cement Corp., and Felix Guenther, Jr., Penn-Dixie Portland Cement Co.

An enthusiastic safety dinner was held that evening at which good fellowship was stressed as a safety asset. The program was concluded with the showing of several reels of movies prepared by the National Safety Council.

LaSalle Meeting Well Attended

The LaSalle meeting, which was held in Hotel Kaskaskia on March 23, was attended by 161 representatives of 15 cement mills located in Illinois, Indiana, Missouri, Kentucky and Michigan as well as the larger industries in and about LaSalle. The meeting was opened by Mayor P. E. Coleman of LaSalle, who welcomed the visitors, paid tribute to the safety work of the local mills and told the audience that he was proud of his record of having used nothing but concrete for street paving during his several years as mayor. His invitation to see the streets and judge them led many visitors on a tour of inspection after the meeting. Thomas R. Halpin, who has been in charge of the safety work of the Marquette Cement Mfg. Company for several years, was chairman of the meeting. Mr. Halpin, with J. J. Bassett and John Allwood of the Lehigh, Joseph Lawniczek and John J. Kelly of the Alpha, and Earl J. Shea of the Marquette company, acted on the local committee.

One of the most illuminating discussions of the meeting was contained in a paper by Dr. W. W. Greaves, plant surgeon of the Alpha Portland Cement Company at LaSalle and a local physician of wide reputation. Dr. Greaves' subject, "Industrial Accidents," stressed particularly the importance of avoiding infections by prompt treatment of small scratches, cuts and bruises, the adequacy of ordinary bandaging to stop flow of blood except in case of extremely severe hemorrhages, as well as

PRELIMINARY TABULATION OF ACCIDENT STATISTICS

YEARS	NO. OF PLANTS REPORTING	MAN-HOURS	NO. OF ACCIDENTS	NO. OF DAYS LOST	DAYS LOST PER 100,000 MAN-HOURS	NO. OF PARTIAL DISABILITIES	NO. OF FATALITIES
1919	67	48,743,357	2119	33,738	69.2	67	38
1920	72	59,585,825	2615	44,748	71.5	82	53
1921	87	62,247,244	2646	42,642	68.5	43	44
1922	94	63,526,647	2592	42,735	67.4	53	52
1923	99	76,640,596	3197	58,523	75.3	86	45
1924	110	87,767,296	3058	53,709	61.4	76	60
1925	120	97,414,794	2541	48,565	49.9	77	61
1926	124	97,382,785	2039	41,717	42.8	56	46

the necessity for continuing artificial respiration two hours before abandoning cases of electric shock, carbon monoxide and carbon dioxide poisoning.

Dr. Greaves stressed the necessity in all cases of continuing artificial respiration without interruption of any kind, even to move patient to hospital, etc., and the advantages of plenty of light in workrooms.

Dr. J. J. Rock, also of LaSalle, plant surgeon of the local Lehigh and Marquette mills, added much valuable discussion, particularly with regard to proper methods of resuscitation. Dr. Rock stressed the necessity for having the mouth and throat passage absolutely clean and clear when the treatment is commenced in order to prevent taking of foreign substances into the lungs. The use of the pulmotor was depreciated. J. J. Bassett, engineer of the Lehigh plant, demonstrated the prone pressure method with a first aid team consisting of William Greening and Julius Spriet.

"Fixing Accident Responsibility," was the subject of a spirited discussion led by Frank H. Sass, Safety Supervisor, Universal Portland Cement Co., W. L. White, Jr., General Superintendent, Sandusky Cement Co., and J. J. Bassett of the Lehigh Portland Cement Co. "How to Get Men to Report for First Aid," was discussed by C. L. Baylor, Assistant Safety Director, Louisville Cement Co. Mr. Baylor stated that a recent fatality in their plant, resulting from a finger scratch on a suspender buckle, had done more than anything else to impress workmen with the necessity for immediate attention to minor injuries.

"How to Interest Men in Their Own Safety" was discussed by W. E. Wuerth, superintendent of the Dixon plant of the Sandusky Cement Co., O. F. Schulzke, Assistant Superintendent of the St. Louis plant of the Missouri Portland Cement Co., G. L. Kirp, Chemical Engineer of the Kosmos Portland Cement Co., R. E. Hoffman, Plant Manager of the Atlas Portland Cement Co., Hannibal, Mo., Vincent K. Newcomer, Superintendent, Indiana Portland Cement Co., and others. The June No-Accident campaign of the Portland Cement Association was explained by A. J. R. Curtis of that association and support was pledged by everyone present.

At the banquet that evening, Henry McClarnan, General Superintendent of the Alpha Portland Cement Company acted as toastmaster. The speakers included Mayor Coleman, J. B. McManus, Superintendent of Schools of LaSalle, N. M. Mason, Superintendent of Schools of Oglesby, and Stuart Duncan of LaSalle, a member of the Board of Directors of the Marquette Cement Mfg. Co.

Other Meetings Scheduled

Similar regional safety meetings will be held at the Muehlebach Hotel, Kansas City, for the cement mills of Kansas, Nebraska, West Missouri, Iowa, Oklahoma and Texas, and at the Elks Club, Allentown, Pa., on May 19, for the mills of the Lehigh Valley and Hudson River regions. W. P. Sabin, Assistant to President of the Ash Grove Lime and Portland Cement Co., will act as chairman of the Kansas City meeting, and H. A. Reninger, Safety Engineer of the Lehigh Portland Cement Co., as chairman of the Allentown meeting.

Portland Cement Association Meeting for May

The Spring meeting of the Portland Cement Association will be held at the Biltmore Hotel, New York City, commencing Monday, May 16, and lasting through the 18th.

Output of Masonry, Natural, and Puzzolan Cements Increased in 1926

Statistics of hydraulic cements, other than portland cement, in 1926, which include masonry, natural, and puzzolan cements, as compiled by the United States Bureau of Mines, Department of Commerce, show that the production—2,104,891 barrels—exceeded that of 1925 by nearly 22 per cent. Shipments of these cements from mills in 1926 increased 16 per cent in quantity and about 11 per cent in gross value. Stocks at the mills also increased and were about 68 per cent higher at the end of 1926 than at the end of 1925.

These statistics represent the output of 11 plants in 1926, which are located as follows: One each in Alabama, Illinois, Indiana, Kansas, Kentucky, Ohio, and Pennsylvania; and two each in Minnesota and New York. One new plant, in New York, began production of natural cement in 1926.

The output has been expressed in terms of 376-pound barrels to correspond with the statistics of portland cement.

MASONRY, NATURAL, AND PUZZOLAN CEMENTS PRODUCED, SHIPPED, AND IN STOCK IN THE UNITED STATES, 1925 AND 1926

	Active	Production	Shipments		Stock (Dec. 31)
Year	Plants	Barrels	Barrels	Value	Barrels
1925	10	1,729,343	1,751,725	$2,551,583	107,459
1926	11	2,104,891	2,031,851	2,820,110	180,499

Course in Fuel Engineering at University

The opening of a new course in fuel engineering at the Towne Scientific School of the University of Pennsylvania, will take place September 30th. The course embraces subjects such as fuel resources, mining methods, composition and combustion of fuels, furnaces, fuel sampling, and testing. A special lecture on powdered fuel by Mr. E. G. Bailey of the Fuller-Lehigh Company, Fullerton, Pennsylvania, is one of those scheduled to be given during the course.

Thermal Losses in Kilns

(Continued from page 109)

The fallacy of operating a large fuel consuming industry without proper combustion supervision may be readily demonstrated. The difference in the fuel costs will usually pay large dividends on the time and trouble of a careful study. The fuel cost is usually the largest single item comprising the manufacturing cost. The possibilities are shown by the economy of the shaft kiln where 35 pounds per barrel was not unknown. With this as an ideal, the present rotary kiln has a long way to travel.

These matters can be handled in a practical way, usually without much change in the equipment. It is more a saving from the constant study of conditions and the adjustment of the apparatus than a change in the apparatus. In some cases a change in the fuel may be advisable. There are many companies using an expensive coal when a lower priced coal would better fit their needs. Where these methods have been adopted the fuel saving will show up in the form of reduced coal bills in a way which cannot be ignored by the executive management.

(To be continued)

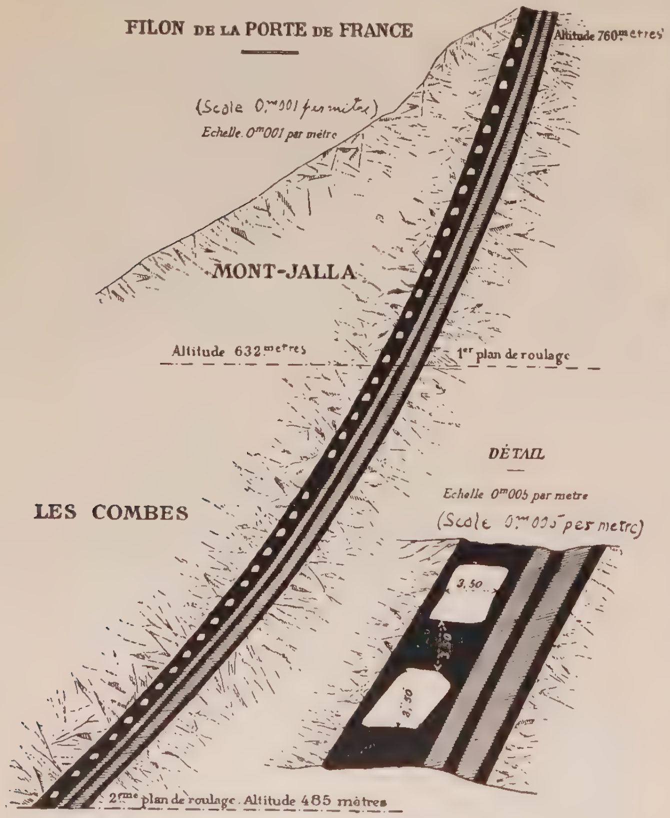
Exploitation of the "Porte Du France" Mills

One of the Oldest and Most Important of the French Cement Producers of the Grenoble Region

ONE of the earliest uses of cement in France has been in connection with the development of water-power and this to a great extent has been responsible for the importance of the region of Grenoble, capitol of the French Alps and heart of the French hydro-electric developments, as a cement producing center.

Fortunately the raw product is to be found there in seemingly unlimited quantities. As early as 1842 Felix Breton, a retired colonel of Engineers of the French army founded a company which became one of the leading cement producing firms of the region and is now known under the name of the *Societe Generale & Unique des Ciments de la Porte du France.* From a small beginning this firm has developed into a world-known concern, capitalized at 5,300,000 francs, with headquarters at Grenoble and branches and agencies in all parts of France and the French colonies as well as throughout most of the European continent.

To appreciate the magnitude of the exploitation of the "Porte du France" one is practically obliged to pay the plant a personal visit as photographs fail to give a just idea. Especially is this true of the quarries which are located in and on the side of Mount Jaffa—a mountain in stature as well as name—overlooking the city of Grenoble.



Showing the method of superimposed galleries used to take the raw material from the mountain

The principal product of the Porte du France is its "Ciment Prompt" which is a natural cement extracted from a huge vein of limestone of practically uniform depth and of an unusual fineness and a chemical composition which has remained uniform since first analyzed in 1845.

View of Mt. Jalla, from which raw materials for the Porte du France mills are taken

This limestone is quarried through a series of superimposed galleries running into the sides of Mount Jaffa and which total 180 kilometres or nearly 110 miles in length. After being brought to the surface the limestone descends the side of the mountain through a series of narrow-gauge railways and a system of tunnels and cisterns.

After passing through the furnaces located at the foot of Mount Jaffa the cement is transported by the company's own railway to its mills at Saint Robert where it is milled and mixed to produce the various special brands which this company produces.

The chief product is the "Ciment Prompt," a natural cement having most of the properties of alumina cement and particularly suitable for use in hydro-electric and all canalization work which requires resistance to water and cold. The absence of shrinkage has made it popular as a material for pipe lines and tunnel work. It has been used in many of the largest hydraulic developments of the country as well as in the water and sewage systems of most of the leading cities of France and the French colonies.

Next in importance is its "Portland Naturel," derived from the same source as the "Ciment Prompt" but given a more intensive burning. Requiring a longer time for hardening, it presents a stronger resistance to pressure and is used for under-ground work requiring strength and permanency.

"Ciment Artificiel" is a high grade artificial cement particularly recommended for use in reservoirs, road-building, bridges, dams and cement blocks.

"Ciment Electro-Alumineux" is the company's alumina cement and naturally they claim for it all the advantages, and more, than other similar products.

The "Porte du France" has become one of the leading cement producers of France not only through the quality of its product but also through its progressiveness.

At all of the recent water-power expositions this company has been represented by very striking and interesting exhibits of their products and their application to this type of work as well as to building and other lines.

U. S. Foreign Trade in Portland Cement During 1926

Imports Less Than in 1925—Tables of Production, Imports and Exports—Belgium is Largest Importer—Some Facts About Belgian Cement Production

By C. F. STEPHENSON
Cement Information Bureau, New York

FROM a statistical point of view the year 1926 has proved to be the most prosperous in the history of the American portland cement industry. Domestic production and shipments of cement have been constantly increasing; 1926, with 141 active plants, surpassing the previous record year, 1925, when there were 138 active plants, by 1.48 per cent, and exceeding 1921 by almost 66 per cent.

While there was a decrease of 11.5 per cent in the imports of 1926 compared with those of 1925, it will be noted that there was a stronger concentration of imports along the Atlantic and Gulf coasts. This, however, was more than offset by a diminution of imports at Pacific ports. Importations by Florida during 1926 amounted to 28.49 per cent; by Massachusetts, 18.97 per cent; and by Philadelphia, 13.31 per cent, or a total of 60.77 per cent of the country's cement imports; whereas, in 1925, these districts accounted for but 43.10 per cent.

In view of the fact that Belgium accounted for over 74 per cent of the total quantity of cement imported into the United States during 1926, a resume of the Belgian trade in cement during the year, with prices and other important pertinent data is included. A glance at the table will serve to show that Belgium forged ahead as an American supplier and that Norway was replaced by Denmark for second place.

TABLE No. 1

Year	Active Plants	Production Bbls. 376 lbs.	Total Imports Bbls. 376 lbs.	Total Exports Bbls. 376 lbs.
1921	115	98,842,049	122,317	1,181,014
1922	118	114,789,984	323,823	1,127,845
1923	126	137,460,238	1,678,636	1,001,688
1924	132	148,859,000	2,010,936	878,543
1925	138	161,659,000	3,655,316	1,019,597
1926	141	*164,057,000	33,232,184	*974,226

*Subject to revision.

The relatively low ocean freight rates accorded European cement consigned to American markets places the product at an advantage as compared with American cement, *in coastal markets only.*

Table No. 2 will substantiate the statement that consumption of foreign cement has been limited to near-coastal or seaboard markets.

TABLE No. 2

Imports of Roman, Portland and Other Hydraulic Cement by Customs Districts

(In barrels of 376 pounds.)

	1924		1925		1926	
Customs Districts	bbls.	Per cent	bbls.	Per cent	bbls.	Per cent
Me. & N. H.	3,324	—	32,492	.08	80,043	2.47
Massachusetts	58,216	2.89	321,256	8.78	613,210	18.97
St. Lawrence	3,837	—	357,625	9.78	11,453	.35
New York	75,046	3.73	15,854	.04	73,207	2.26
Philadelphia	167,654	8.33	282,365	7.72	430,371	13.31
So. Carolina	10,580	—	45,866	1.25	8,985	.02
Florida	121,836	6.05	973,018	26.6	920,865	28.49
New Orleans	93,294	4.63	157,007	4.29	254,212	7.86
Mobile	—	—	41,684	1.14	158,433	4.90
Los Angeles	613,605	30.51	370,130	10.12	46,391	1.43
San Francisco	106,865	5.31	131,427	3.59	31,527	.09
Washington	126,512	6.29	169,412	4.63	117,126	3.62
Hawaii	226,556	11.26	197,871	5.41	73,128	2.26
Porto Rico	333,230	16.56	318,134	8.70	316,485	9.79
Galveston	12	—	—	—	17,705	.54
Oregon	34,094	1.69	116,009	3.17	67,419	2.08
Vermont	27,237	1.35	54,379	1.48	1,514	—
Rochester	2,580	—	9,258	—	1,197	—
Buffalo	6,458	—	60,319	1.65	161	—
Virginia	—	—	1,150	—	—	—
Dakota	—	—	60	—	—	—
Connecticut	—	—	—	—	8,448	—
Maryland	—	—	—	—	250	—
Michigan	—	—	—	—	24	—
Total	2,010,936	—	3,655,316	—	3,232,184	—

The following table indicates the percentage of U. S. imported cement furnished by each country for the years

1924, 1925 and 1926:

	1924	1925	1926
Belgium	50.64	52.5	74.4
Denmark	15.56	9.3	12.83
Norway	26.14	16.2	1.46
United Kingdom	1.43	—	2.6
Estonia	1.66	.9	2.2
Sweden	.77	—	—
Germany	.60	.4	—
Netherlands	.30	—	.4
France	.27	.3	2.27
Canada	2.14	19.45	1.84
Others	.49	.95	2.00
	100.00	100.00	100.00

Of the Belgian exports of cement to the United States during 1926, 68 per cent passed through the Antwerp Consular District, 27 per cent through Brussels Consular District and 5 per cent through the Ghent Consular District.

Production of Cement in Belgium

It is not possible to obtain official data revealing the monthly production of cement in Belgium, but it is known that the production of this commodity was normal during January, 1927. Because of the decline in the volume of orders placed by domestic buyers as well as a decrease in the number of orders received for the export trade, it is likely that there will be a slackening in the production of cement in the near future. Already, a number of plants have made cuts in the number of their employees and the heavy accumulation of stocks on hand at most centers of production leads to the belief that the production of cement will be lighter than normal during the next two or three months. Official production figures for 1926 are not yet available.

During January the market for cement was not very active and the general situation was not as satisfactory as it has been during the past several months. A number of Belgian cement plants are suffering from a lack of orders and as a result there has been an accumulation of stocks on hand. Producers are beginning to reduce their personnel in a number of factories and it would not be surprising to see additional reductions of personnel if the present situation persists. The genesis of the present situation is to be found in the cancellation or restriction of credits for the completion of public works which has resulted in a heavy decrease in the domestic demand for cement. At the same time there has been a diminution in the volume of orders for the export trade. However, there is no cause for alarm at the present situation because there is always a seasonal decline in the demand for construction materials and Belgian cement producers are not worried over the future prospects of the industry.

Official customs statistics showing cement exports from Belgium in barrels of 376 pounds for 1924, 1925 and first eleven months of 1926, follow:

Countries of Destination	1924	1925	Jan. to Nov. 1926
Argentina	430,853	631,120	775,364
Brazil	282,429	236,480	165,378
French Antilles	—	69,123	54,394
Egypt	157,621	—	214,670
France	1,019,584	666,143	542,699
Germany	88,142	—	—
Great Britain	650,784	721,202	868,738
Morocco	93,523	—	—
Netherlands	1,744,232	2,064,934	1,902,897
Syria	114,942	180,057	—
Fr. West Africa	—	74,819	99,799
United States	939,742	2,013,104	2,008,630
Belgian Congo	—	—	103,010
Peru	—	81,938	—
Canada	—	—	8,340
Canary Islands	—	115,306	119,137
Others	691,529	894,838	751,418
Total	6,213,381	7,749,064	7,614,474

Wholesale Prices for Export

Cement for export is quoted f.o.b. Antwerp as well as on a c.i.f. foreign port basis. In general, cement shipped from Antwerp arrives from the plants in the interior by means of canal barges. Barge transportation in this country is comparatively cheap, and the cost of shipping cement in this manner varies from 10 to 15 francs per ton, depending on the distance of the haul. An additional charge of 0.75 francs per ton is made for loading cement directly into vessels at the port at Antwerp.

No quotations were available in Belgian currency for exports of cement during January. During the past month all transactions recorded with the export trade were made on a foreign currency basis. Dollar quotations on exports to the United States, according to the records of the three consular establishments in Belgium, ranged from $1.85 to $2.38 per 4 bags c.i.f. Atlantic or Pacific port, and $1.00 per barrel, f.o.b. plant.

Quotations on cement produced in the Antwerp district are not so high as a rule, as those made by producers in the Brussels and Ghent districts, inasmuch as Antwerp is the principal port of shipment for Belgian cement.

Eleventh Exposition of Chemical Industries

The coming Eleventh Annual Exposition of Chemical Industries to be held in Grand Central Palace, New York City, September 26th to October 1st, inclusive, is an outstanding feature for this year. Plans are progressing rapidly and the indications are that many new and interesting features will be exhibited.

The program of the Students' Course, conducted by and in charge of Prof. W. T. Read, Texas Technological College, will be divided into two sections. The first will be the elementary students' course and the second, an advanced course.

As in the past, rigid tests and records of the students' work will be kept and forwarded to the institution from which the student registers.

Prominent among the features will be the following: The Southern Section by states and railroads and showing the raw materials and opportunities of the Southern States; the Canadian Section by provinces and railroads to show the raw materials of Canada suitable for industrial development; the Container Section, exhibiting containers used in industry with the machinery for packaging, bottling, and labeling; and a Laboratory Supply and Equipment Section. The sectional exhibits will be supplemented by displays of chemical products, machinery used in manufacture and development, dyes and fine chemicals, as well as instruments of precision, unit processes developed and in operation.

These exhibits are supported by a program now being developed by the Advisory Committee composed of eminent chemists and leaders in the field.

EDITORIALS

Cement Salesmanship

THE story is told that a cement salesman who was hard put to it to land a certain important job for his company, resorted to an unusual method of selling to land the contract. Prices were found to be practically identical when the bids were opened and the sales arguments centered around the question of quality.

The salesman in question based his contentions for superior quality on fine grinding. To bear out his claims, he brought with him a standard 200-mesh sieve and a sample of his cement. With these he proceeded to demonstrate that a larger percentage than called for in the standard specifications passed through the sieve. Then he based his arguments on the contention that it was that part of the cement that passed the 200-mesh sieve that actually carried the cementing quality. The residue, he said, was so much inert matter.

He got the contract.

The point of interest in this incident is the fact that this salesman based his sales argument on a technical basis. Whether or not his contentions were scientifically accurate is not so important. They accomplished his purpose—to land that contract.

The incident illustrates the newer development in cement salesmanship. No longer do salesmen claim that all cements are equal in quality and base their sales arguments on better service as in the past. It is now almost necessary that a cement salesman be a technician. He must be able to read tabulations on chemical and physical analyses of cements intelligently. He must have sufficient technical knowledge of the nature of cement to combat the claims of his competitors for superior quality because of this or that variation in chemical or physical properties from the standard specification. He must know upon what basis certain cement manufacturers claim superiority for their product.

More and more is the cement plant chemist called upon for sales helps. It is not unusual now to have the chemist call on difficult sales prospects and explain to them the technical advantages of his particular brand of cement.

Selling cement is becoming an increasingly difficult problem. Overproduction has made it necessary to sell harder. The claims made by manufacturers for special qualities over and above the standard requirements have added a new problem. Cement can no longer be sold under the old methods. Salesmen, now more than ever before, must learn the essential technical facts not only about their own cement but also about their competitors'.

Three-Day Strengths

IT was not so long ago that buyers of cement were concerned only with 7- and 28-day strengths of cements as a basis for purchasing. Today the situation has changed and 3-day strengths are becoming of increasing importance.

That cement manufacturers are taking this new requirement into consideration is shown by the steadily increasing emphasis put on the ability to attain high 3-day strengths, by advertisements, folders and pamphlets issued by cement companies, calling attention to the jobs on which high early strength concrete was obtained with standard portland cements.

Another indication is the fact that laboratory tests of cement now often carry the results of 3-day tests and sometimes even 24-hour tests. It is on these results, when they are favorable, that many bags of cement are sold. High early strength is one of the most important sales arguments that can be used.

Products manufacturers are especially benefited by high early strength. They are willing to pay premiums for this quality so as to reduce breakage and facilitate immediate safe handling. A certain cement manufacturer determined to supply this demand in order to build up his winter business. He found that he could manufacture a cement with the properties desired at a cost greater by only five cents per barrel than the cost of his standard cement. Products manufacturers appreciated this special service and the winter sales of that company increased 60 per cent.

There are indications that before long high early strength portland cement will be available everywhere. Many manufacturers are experimenting with it, some have announced that they will provide it and others are already marketing it on its special qualities. European manufacturers who have long provided this type of cement are looking favorably on America's hesitancy to produce it generally. One big foreign manufacturer is already planning to supply the seaboard market with a high early strength cement.

A new demand creates a new opportunity. The changing criterion of desirability as indicated by the growing importance of the 3-day test over the 7- and 28-day tests presents an opportunity to American manufacturers.

New Dust Recovery System Effects Substantial Savings

New Flue Dust Recovery System Demonstrates Its Value in Year's Trial at The Manitowoc Portland Cement Company Plant—A Description of the Equipment—Records of Performance

IN May, 1926, the Manitowoc Portland Cement Company installed a new type of dust recovery equipment on No. 3 kiln in its plant at Manitowoc, Wis. Careful records of the performance of this installation showed savings of approximately $1,700.00 per month.

The installation was designed and perfected by R. H. Minogue, assistant superintendent of the plant. It reclaims the flue dust that is ordinarily wasted and returns it to the kiln. As shown in an accompanying illustration, the equipment consists of a scoop attached to the outside of the kiln. The scoop is housed in an air-tight metal jacket so as to prevent the introduction of cold air into the kiln.

The reclaimed flue dust is picked up by a bucket elevator from under the dust hoppers under the boiler and is then taken by a screw conveyor to the flue dust feeder. The dust is introduced to the kiln at a point below the wet zone, where it combines with the raw materials and is burned in the kiln.

Savings Effected

Records of the amount of flue dust reclaimed from June, 1926, to October, 1926, are as follows:

	Tons
June	490.1
July	484.1
August	622.0
September	486.3
October	470.6

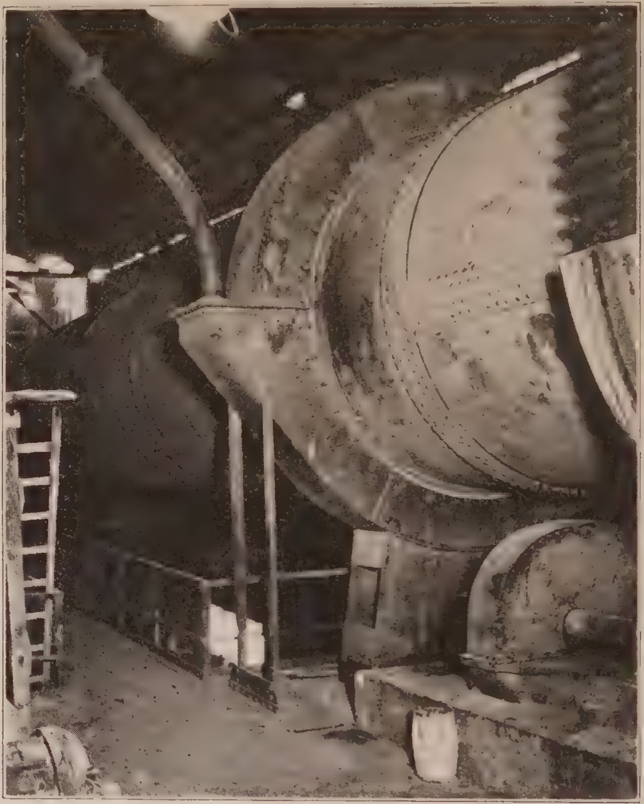
The total dust recovered from the time of installation to the end of October was 2,836 tons.

When wasting this dust, it was necessary to dispose of it by having it hauled on a scow at a cost of 34½ cents per ton.

The value of this flue dust, recovered in terms of raw mix, figuring the cost of production to this point and determining the number of barrels of cement obtainable from the amount of material previously wasted was $5,835.56. If this dust had been disposed of as waste, it would have cost $978.42 merely to dispose of it. Adding these two figures, the total saving would be $6,813.98, giving an average monthly saving of $1,362.80.

This estimate does not take into account the differences in labor costs in the regular operating shifts required to handle the flue dust from the boilers for disposal to the waste pile as compared to the cost of handling the dust under present conditions. The previous arrangement cost $25.50 per day for labor, as compared to $12.40 at the present time, a saving of $13.10 per day, or $393.00 per month. The total apparent savings are, therefore, $57.63 per day, or $1755.80 per month, or $21,034.95 per year.

Besides these directly computed savings there is another factor that is hard to assign a definite value to. This is the kiln production. It was found that No. 3 kiln, equipped with the dust recovery system, showed a daily average production of about 100 barrels of cement more than the other two kilns that were not so equipped. Even when the average flue dust recovery of 77 barrels per day is taken into account and added, the kiln still shows an additional production of more than 20 barrels.



An illustration of the flue dust recovery system as installed on kiln No. 3 of the Manitowoc Portland Cement Company

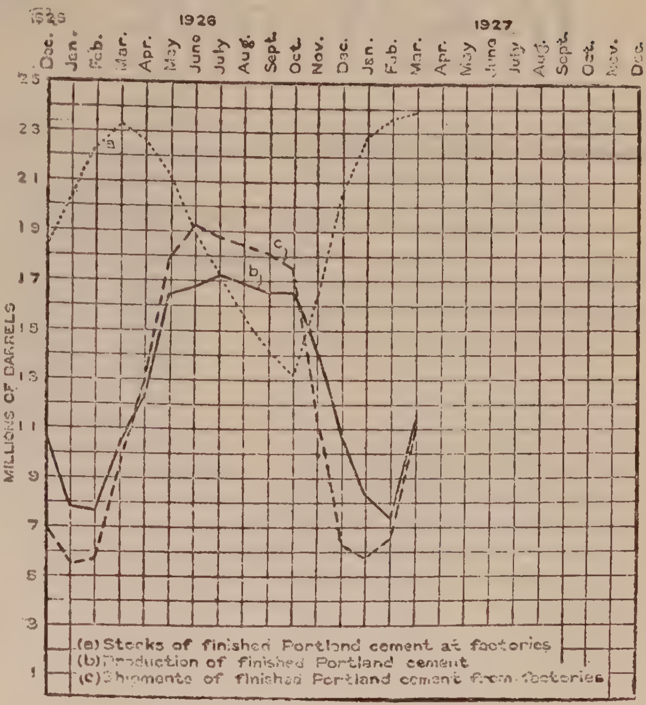
Onoda Plans Korean Mill

The Onoda Portland Cement Company has entered into a joint investment with the Mitsui Bussan Kaisha to erect a large cement factory in Korea. The Onoda firm has decided to invest 10,000,000 yen for the enterprise. It has contracted to buy 500,000 tsubo (one tsubo being six square feet) of land in Senri, Bunsengun, South Kankyo District, in Korea, to build the factory. The building cost is estimated at 4,000,000 yen and work is to be completed the end of next year. The annual production is 500,000 bbls. initially, to be increased to 2,000,000 bbls. after 1930.

Cement Statistics for March

MARCH production and shipments of portland cement were the greatest for that month in any year, according to the Bureau of Mines, Department of Commerce. Production shows an increase of over 10 per cent, and shipments an increase of more than 16 per cent, as compared with March, 1926. Portland cement stocks at the end of March, 1927, are 3 per cent in excess of the stocks at the end of March, 1926, and are the greatest at the end of any month in the history of the industry.

Production and shipments of portland cement for the first quarter of 1927 show increases respectively of 4 and 13 per cent over the corresponding period in 1926.



Estimated Clinker (Unground Cement) at the Mills at End of Each Month, 1926 and 1927

(Figures represent thousands of barrels)

Month	1926	1927
January	9,074	9,989
February	10,931	*11,943
March	12,290	13,003
April	12,967	------
May	11,695	------
June	10,144	------
July	8,604	------
August	7,362	------
September	6,112	------
October	5,370	------
November	5,748	------
December	7,799	------

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*Revised.

Production, Shipments, and Stocks of Finished Portland Cement, by Months, in 1926 and 1927

(Figures represent thousands of barrels)

Month	Production 1926	Production 1927	Shipments 1926	Shipments 1927	Stocks at end of month 1926	Stocks at end of month 1927
January	7,887	8,258	5,674	5,968	20,582	22,914
February	7,731	*7,377	5,820	*6,731	22,385	*23,560
March	10,390	11,452	9,539	11,083	23,236	23,930
First Quarter	26,008	27,087	21,033	23,782	------	------
April	12,440	------	12,965	------	22,710	------
May	16,510	------	17,973	------	21,255	------
June	16,866	------	19,134	------	19,000	------
Second Quarter	45,816	------	50,072	------	------	------
July	17,134	------	18,812	------	17,301	------
August	16,995	------	18,583	------	15,718	------
September	16,571	------	18,087	------	14,188	------
Third Quarter	50,700	------	55,482	------	------	------
October	16,596	------	17,486	------	13,334	------
November	14,193	------	11,276	------	16,243	------
December	10,744	------	6,432	------	20,616	------
Fourth Quarter	41,533	------	35,194	------	------	------
	164,057	------	161,781	------	------	------

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*Revised.

Commercial District	Production—March 1926	Production—March 1927	Shipments—March 1926	Shipments—March 1927	Stocks at end of March 1926	Stocks at end of March 1927	Stocks at end of Feb. 1927*
Eastern Pennsylvania, New Jersey and Maryland	3,032	2,997	2,416	3,081	5,732	5,677	5,761
New York	374	597	335	481	1,629	1,568	1,453
Ohio, Western Pennsylvania and West Virginia	626	1,265	679	925	2,739	3,283	2,942
Michigan	223	551	390	596	1,780	1,975	2,019
Wisconsin, Illinois, Indiana and Kentucky	1,208	1,290	942	1,187	3,966	3,341	3,239
Virginia, Tennessee, Alabama and Georgia	1,241	1,201	1,189	1,220	1,111	1,178	1,197
Eastern Missouri, Iowa, Minnesota and South Dakota	744	714	724	729	3,087	3,226	3,241
Western Missouri, Nebraska, Kansas and Oklahoma	848	753	760	725	1,487	1,584	1,556
Texas	452	465	403	492	536	448	475
Colorado, Montana and Utah	142	118	191	138	308	462	482
California	1,259	1,196	1,264	1,196	501	704	704
Oregon and Washington	241	305	246	313	360	484	491
	10,390	11,452	9,539	11,083	23,236	23,930	23,560

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*Revised.

MEN and MILLS

Notes from the Field

Missouri Portland Plans Quick-Hardening Cement Plant

$1,500,000 in Shares Offered to Present Stockholders

A plant for the manufacture of quick-hardening cement will be erected soon by the Missouri Portland Cement Company on land it owns adjacent to its present portland cement plant at Prospect Hill, St. Louis County, Missouri. The project will be financed with the proceeds of the sale of $1,500,000 of treasury stock about to be issued.

The capacity of the plant and the number of workmen it will employ have not been made known.

A letter to stockholders of the company, announces that one share for each four they now hold is available at the par of $25 a share. Sixty thousand new shares are to be issued. Missouri Portland stock was quoted recently at $50 a share. This, with the balance of the financing plan, will leave the company free of bonded indebtedness, it is reported.

Petoskey Testing New Rotary Pump

The Petoskey Portland Cement Company is said to be testing a patented invention, the Petoskey rotary pump, in its plant at Petoskey, Michigan. The pump is designed for general uses and is reported to have fulfilled all expectations up to date.

The outfit is an entirely new machine, embodying principles fundamentally different from the Blackmer pump. Robert Blackmer is no longer associated with the venture and entirely new plans are being worked out, it is reported.

$2,000,000 Lawrence Issue Offered on Market

Two eastern financial houses are offering an issue of $2,000,000 Lawrence Portland Cement Company fifteen-year 5½ per cent gold debentures, due April 1, 1942. The debentures are direct obligations of the company and are issued under a trust agreement restricting the mortgaging and pledging of the company's assets and the creation of additional funded indebtness. The price is $98.50, to yield 5.65.

North Carolina Site for Plant Selected

Mr. J. A. Acker, of Port Huron, Michigan, and associates have selected a site at Newbern, North Carolina, as the location for a proposed cement plant. Three million dollars is reported to be the cost, with a capacity of 1,250,000 bbls. annually. Supplies of limestone as well as marls at the Trent River, which has been under investigation by A. F. Greaves-Walker and Dr. G. R. Shelton for the past two years, are nearby. North Carolina consumption, according to Dr. Greaves-Walker, will take the entire production.

Pacific Portland Incorporates

The Pacific Portland Cement Company has filed articles of incorporation, with a capitalization of $30,000,000.

Construction Begins on Keystone Plant

Work began Monday, March 14th, on the Keystone Portland Cement Company at Bath, Pennsylvania.

Seven per cent cumulative preferred stock amounting to $2,500,000 has been placed on the market, priced at $100 a share, with a bonus of one share of common stock of no par value.

To Check C. H. Sonntag's Report on State Plant

A check against the report on the Michigan state cement plant made by C. H. Sonntag, engineer, has been ordered by Governor Green. The second report is to be prepared by a national firm of appraisers.

A later report states that the Manufacturers' Appraisal Company has completed its work on the plant and that the new appraisal places a decidedly lower valuation on the plant and inventories. Two items in particular are scaled down by over $100,000 to bring their valuations into harmony with what is claimed to be sound business practice. What these two items are is undisclosed.

Monolith Establishes Wyoming Subsidiary

Launching an expansion program that will enable the distribution of cement production over a large territory in the intermountain states as well as in the Pacific coast region, the Monolith Portland Cement Company has announced the inauguration of the Monolith Portland Midwest Company with large holdings near Laramie, Wyoming, where a new cement plant will be erected and placed in operation soon.

The Monolith Midwest is a separate corporation directed by the same official personnel. Its new plant will serve points in Wyoming, Colorado and Nebraska, and the company plans to supply a portion of the cement consumption, which in that territory last year exceeded 1,300,000 barrels.

Officers and directors of the two companies include Coy Burnett, president; Wilmar Evans, vice-president and general manager; J. J. Calkins, secretary and treasurer; W. S. Trueblood, general superintendent in charge of operation at the Monolith Mills; C. A. Low, director of sales, and Tom Larson, traffic and assistant sales manager.

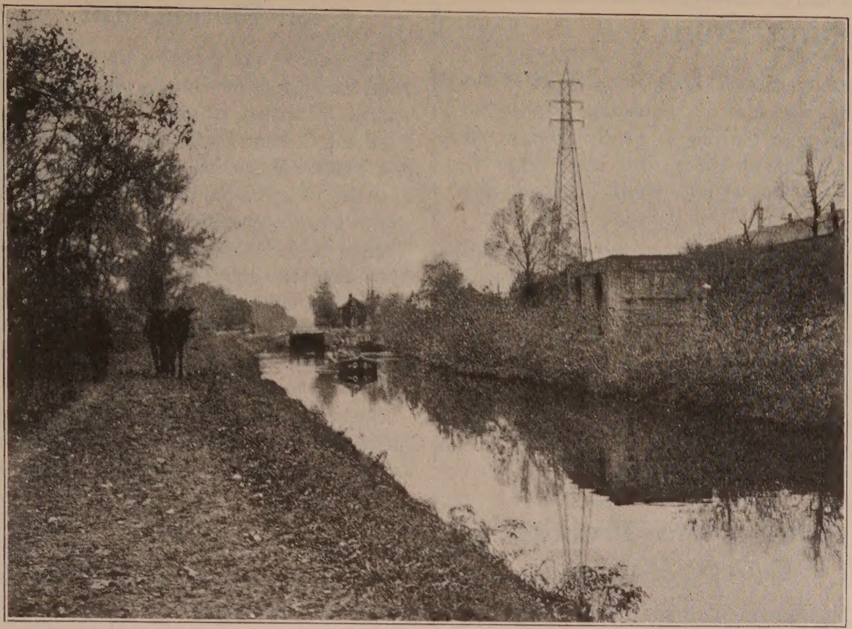
Stockholders of the Monolith Company were recently given the purchase rights in the new company, and these rights having expired, a small portion of stock is now being offered for public subscription. The Monolith Portland Midwest Company has established offices in Los Angeles, San Francisco, Oakland, San Diego, and San Jose.

Olympic Cement Purchases Lime Holdings

Transfer of the holdings of the International Lime Company, near Sumas, Washington, to the Olympic Portland Cement Company, Seattle, was disclosed in a deed filed recently. $100,000 was the sum involved.

Production of Basic Cement Begun

Manufacture of Basic portland cement began at the Kenova plant of the Basic Products Company with the beginning of April, according to an announcement made by A. T. Wood, general manager of the plant.



The old Rock Lock mills on the banks of the Lehigh Canal, out of which grew the Siegfried mill of the Lawrence Portland Cement Co. The mill was first used for making natural cement and the first portland cement was made here in 1889. *The mill was operated by water power for some time until a steam power plant was installed*

Highway Commissioner Lays Claim to State Cement

Reports say the state of Michigan has $500,000 in cement at the Chelsea cement plant which belongs to the Highway Department, of which Frank F. Rogers, Highway Commissioner, was unaware until recently. Mr. Rogers reported to the state administrative board that he discovered that $500,000 in cash was advanced to the cement plant from the highway fund. Of how it was done, Mr. Rogers said he was also unaware.

The department is expected to take out the advance trade, according to the provisions of the transfer made a year ago.

Coal Room Explosions at Aetna Plant

Combustion of gases was given as the cause of two coal-room explosions two days apart at the Essexville, Michigan, plant of the Aetna Portland Cement Company early in March. The explosion blew the roof of the building out of shape, shattered windows and sent doors on the building through space for a distance of 100 feet.

Newaygo Employes Feasted and Entertained

The annual banquet of the employees of the Newaygo Portland Cement Company was held at Newaygo, Michigan, on Thursday, March 17th, with an attendance of 150.

To Build Seattle Plant, Coal Chief Hints

During a visit in Seattle, Washington, Walter Barnum, head of the National Coal Association, is reported to have declared that his company, the Pacific Coast Company, will build a cement plant at or near Seattle. It will require an expenditure of about $2,000,000 and its first unit will produce 500,000 barrels annually.

Mr. Barnum stated that the design of the plant is under way and that announcement of its location will be made in the near future.

Alpha's Michigan Plant Reopens for 1927

The Bellevue, Michigan, plant of the Alpha Portland Cement Company, for the first time since last October, is operating again, now in full force.

Warren Erwin, Chicago civil engineer, arrived there recently to fill the place made vacant by the transfer of Harry Brewer to the LaSalle, Illinois, plant.

Gold Hill Changes Partially Completed

A portion of the extensive improvements begun at the Gold Hill, Oregon, plant of the Beaver Portland Cement Company plant two months ago have been completed. The rotary kiln is now enlarged to increase the daily capacity from 1000 to 1600 barrels a day.

Reconstruction of the quarry at Marble Mountain as well as electrification of its equipment, and that of the company's railway, will now be pushed to consummate plans laid by the company last year.

Plans for White Cliff Plant Growing

Another step toward the establishment of a White Cliffs (Arkansas) Development Company cement plant was taken at a meeting of the Ashdown Chamber of Commerce, in the later part of March, when unanimous indorsement was given to the building of a highway from Ashdown to White Cliffs. A committee was appointed to select the best route.

Capacity of the plant is expected to be 500,000 bbls. Employes would be housed at Ashdown, since it is not thought best to establish a town at White Cliffs.

Lehigh Welcomes 1927 Safety Committee

The Workmen's School, a part of the Safety First division of the Union Bridge, Maryland, plant of the Lehigh company, feted the incoming 1927 safety committee recently at a banquet. The only serious talk of the evening was made by Superintendent G. S. LaForge, touching upon the value of accident prevention and expressing his appreciation to the retiring 1926 committee.

Wolverine Plants Return to Operation

Both the Coldwater and the Quincy, Michigan, plants of the Wolverine Portland Cement Company have again begun operation. Until recently, power driven units at the Quincy plant were in the process of electrification.

English Plant Shows Decreased 1926 Revenue

According to a report made by Associated Portland Cement Manufacturers, Ltd., England, the revenue for the year ended December 31, 1926, amounted to £788,379. After adding £131,334 brought forward, placing £265,000 to depreciation reserves, £91,649 to sinking funds, and providing for debenture stock, mortgage and other interest, also directors' fees, etc., there remains £347,457. The directors recommended providing for preference dividend already paid and accrued, also payment of dividend on ordinary shares of 4 per cent, leaving £131,509 to be carried forward. The total revenue at £788,379 shows a reduction of £110,445 as compared with the preceding year.

Extensive Universal Harbor Improvement Approaches Finishing Point

Expediting shipments of cement throughout the Great Lakes region by supplementing present rail transportation with deliveries by boat to all ports on the lakes will be made possible by the new $2,000,000 harbor improvement just being completed at the Chicago plant of the Universal Portland Cement Co.

The deepest harbor on the Great Lakes, one of the largest and heaviest boat-unloading bridges in the Chicago district, a 55-acre harbor basis, a 30-acre storage yard, an electrically operated belt conveyor nearly a mile long and a lighthouse with one of the brightest beacons on the southern end of Lake Michigan are features of this new development.

The new storage yard with its capacity of a million tons for limestone will insure adequate supplies of raw materials necessary for uninterrupted production. The harbor basin affords ample anchor space for several boats. The concrete dock, over 1,800 feet long and 600 feet wide, can accommodate a number of vessels and thus provides at the same time facilities for unloading limestone from Michigan quarries and for loading cement for shipment by boat throughout the Great Lakes region.

"The largest boat and the fastest freighter on the Great Lakes, now being built at Lorain, Ohio, will be an important phase of our improved service to customers," said B. F. Affleck, president of the Universal company. "It will be a completely electrified self-unloading craft, 625 feet long and 65 feet wide, with a capacity of over 12,000 tons of limestone. With its electric unloading equipment working at the rate of nearly a ton a second, it can discharge this large cargo direct to our storage yard in about five hours.

"In addition to this special boat which unloads itself, standard lake steamers docked at our wharf can be quickly unloaded by the electrically operated bucket-handling bridge. These facilities will speed up operations and aid in securing continuous production and steady shipments."

International Makes Annual Report to Stockholders

The annual report of President H. Struckmann of the International Portland Cement Corporation for 1926 discloses a net consolidated income for the year, minus depreciation, depletion reserves and federal income taxes, of $4,355,199.42, as compared with $3,976,385.21 for 1925. Allowing for preferred dividends paid, this net income is equivalent to approximately $6.52 per share on the 562,500 shares of common stock outstanding at the close of the year.

Dexter Mill's Superintendent Retires

O. H. Hess, superintendent of the Dexter cement mill, a unit of the Pennsylvania-Dixie Corporation, has retired since May 1st. Mr. Hess was one of the pioneers in Northampton County and was for twenty-six years superintendent at the Dexter plant.

Veteran Is Vice-President of Georgia-Portland

The Georgia-Portland Cement Corporation, which will build a large plant near Sandersville, Georgia, has established offices in Atlanta. Organizers of the company are J. L. Hankinson, the president, and J. I. McCants and J. C. Hagler, vice-presidents.

Mr. McCants is a veteran southern cement man and was for twelve years manager of sales for the Standard Portland Cement Company at Leeds, Alabama. Until recently he was connected in the same capacity with the Signal Mountain Portland Cement Company, Chattanooga, Tenn.

Approximately 827 acres of lime rock and clay are owned in fee by the company, and it is proposed to erect a plant with an initial capacity of 1,000,000 barrels and an ultimate capacity of 1,500,000 barrels annually.

Clinker Shed Contracted for by San Antonio

Contract for a two-story, 82x180 feet reinforced concrete and structural steel clinker shed has been awarded to A. Vogel & Company, by the San Antonio Portland Cement Company, at Cementville, Texas. W. E. Simpson and Company are the engineers.

Missouri Geological Survey Makes Study

Figures given in the 1925 issue of "Mineral Industry" show that Missouri produced a total of 8,371,000 barrels of cement in that year, an increase of approximately 16 per cent over the preceding year.

"Mineral Industry" summarizes the extent of Missouri's mineral deposits and was prepared by the Missouri Geological Survey.

Work Continuing Steadily on Florida Mill

The bulk of the concrete work has been completed and machinery is being installed in almost all units of the Florida Portland Cement Company plant at Hooker's Point. Work has commenced on the erection of steel buildings to enclose the working units, according to O. A. Hartley, Tampa superintendent of construction. More than two thousand tons of steel will be utilized in the eight or nine structures to be built. Steel fabrication and erection is being done by the Virginia Bridge and Iron Company of Norfolk, Virginia.

Work has also begun on the power house, and on the steel forming the covering for the storage and crushing plants.

The concreting construction is being done by the Cowham Engineering Company itself, under the direction of F. F. Dodge, chief engineer, and Mr. Hartley, continuing steadily until the latter part of the summer, when the plant will be ready to run.

Progress is also reported at the rock and clay pits at Brooksville. Forty men are employed at these quarries in preparation for the locally new industry.

Southwestern Appoints Sales Manager for El Paso

The appointment of William R. Blair, as sales manager of its El Paso, Texas, plant has been announced by the Southwestern Portland Cement Company. Mr. Blair succeeds the late Homer C. Swearingen.

G. S. Brown Visits Pacific Coast States

G. S. Brown, president of the Portland Cement Association and of the Alpha Portland Cement Company of Easton, Pa., in company with his wife, C. A. Irvin, vice-president of the Alpha Company, and Mrs. Irvin, visited Southern California during March. He is making a complete tour of the Pacific coast states, and this trip marks his first visit to California in eight years.

Capitalists Plan Cement Mill for Kentucky

Basic requirements for the manufacture of portland cement are said to be present in 50,000 acres of land purchased at Morehead, Rowan County, Kentucky, by a group of Chicago capitalists headed by Mrs. Mary Martin. Two railroads and a coal mine are reported to be included in the purchase price of $2,000,000.

A portion of an appropriation of several million dollars is to be invested in a new cement plant, according to reports.

Changes as Aid to Greater Production Completed at Georgia Plant

Penn-Dixie Plant No. 2 Extended

A third unit extension at Plant No. 2 of the Pennsylvania-Dixie Cement Corporation at Clinchfield, Georgia, has been completed. Production now amounts to 3,600 barrels per day, which will be maintained for some time to come. Additional changes have been made in the storage silo capacity from 80,000 barrels to 140,000, and in an increase of the number of large concrete silos to 14. A new $30,000 crushing plant has also been put into use recently.

Alexander A. Holm, engineer of the plant, was in charge of the new construction work, and the Spencer Construction Company was the contractor.

Tennessee Production Comparison Shows 1926 Increase

A comparison of cement production in Tennessee in the two years 1926 and 1925 has been announced by O. P. Pile, director of the division of mines, for the state. This shows that in 1926 the value of the product from the four plants in the state amounted to $7,895,760; $7,298,382 in the year 1925. The average number of employes in 1926 was 797 and 1925 was 839. The four plants paid out for wages in 1926, $1,110,433 as against $1,188,742 in 1925. The average wage per day in 1926 was $3.82 and in 1925, $3.85. The quantity of cement produced in 1926 was 5,221,814 barrels as compared with 4,790,991 barrels in 1925.

The four cement plants now being operated in Tennessee are located at Richard City, the Pennsylvania-Portland Cement Co. and the same company at Kingsport, Tenn.; the Hermitage Portland Cement Co. at Nashville and the Signal Mountain Portland Cement Co. at Chattanooga. A fifth plant is nearing completion at Cowan, Tenn., which will be known as the Cumberland-Portland Cement Co and the state production of 1927 will be increased to more than $10,000,000 in value, it is believed.

Monolith Installs New Fuel Gas System

Completion of a 32-mile pipeline by the Midway Gas Company, bringing additional fuel facilities to the plant of the Monolith Portland Cement Company at Monolith, Cal., from Quail Lake is increasing cement manufacture, according to W. S. Trueblood, superintendent of the Monolith mills.

Until the new fuel-gas system was installed, power facilities were extremely limited, Mr. Trueblood said. The plant is now operating almost entirely on the new gas supply.

10 Per Cent Reduction Affects State Highway Contract

Bids for the 1927 Indiana State Highway Commission cement contracts, opened recently by the commission, reflected the 10 per cent reduction previously quoted in the open market. Sixteen cement companies and manufacturers entered bids.

The highway commission used approximately 700,000 barrels of cement last year at a net cost of $1.75 a barrel. The opened bids indicated that the commission can contract for the 1927 cement at approximately $1.65 a barrel net. $2.15 a barrel was the average gross cost.

Steals Cement Plant Coal; Caught and Fined

Using a team and wagon, an Oglesby, Illinois, man had plans to get a supply of coal without payment and was well on his way, when he was discovered in the coal storage of the Marquette Cement Manufacturing Company's plant. The thief had driven into the storage and had his wagon loaded when he was discovered and placed under arrest.

He was later arraigned in court, where the case was dismissed after he had paid the costs and for the coal taken.

Missourians Have Social Get-Together Meeting

Twenty-eight foremen and sub-foremen of the Missouri Portland Cement Company, Kansas City, Missouri, attended a recent get-together meeting and dinner in an Independence (Kansas) church.

Although this was the first of such meetings in that city, a number have been held in Kansas City, according to J. G. Morgan, superintendent of the plant.

Cement Rates Right

Rates on cement in carloads, from Ilasco, Missouri, to destinations in Nebraska, Illinois, Wisconsin, Michigan, Minnesota, Iowa, South Dakota and Missouri were found not unreasonable or unduly prejudicial in a decision by the Interstate Commerce Commission at Washington, D. C., recently.

Imported Cement Brought to Pacific Coast

The new French line steamer, Nevada, brought its second cargo of cement from France to the Pacific Coast. The cement was discharged at Marshfield, Ore., after which the steamer proceeded to Portland and the Puget Sound.

Gypsum Prepares For Competition

United States Gypsum stockholders have recently ratified the $10,000,000 increase in the common stock, making the total authorized common stock $25,000,000. All directors were re-elected.

In his statement to stockholders, President Sewell L. Avery emphasized his belief that increased competition was ahead in the building materials field.

"A somewhat smaller program of expenditures for 1927 has been authorized by the board of directors, and is progressing," he said. "These needed developments have the same purpose of economy. Provision to finance these commitments has been made by setting aside funds in the government securities listed in the attached reports.

"Competition has been increasingly active throughout the year, and indications point to a continuation of this condition. While the average price reduction approximates 4 per cent on the company's sales, generally considered it is to be noted that the markets in many sections have on some commodities met such reductions in price as to seriously reduce profits.

"Decrease in manufacturing cost has been more than equal to the decline in price. This is a gratifying justification of past plant expenditures, as the major part of this cost reduction is the direct result of recent plant investments."

Indiana Plant Official Gives Opinion of Future

Cement consumption in this country reached a new high level during 1926, according to D. S. MacBride, manager of the Indiana Portland Cement Company.

Mr. MacBride said that the cement mills now in operation could, working at capacity, produce in less than ten months the total present annual requirements of the United States. "It is estimated that total shipments in 1926 by American cement plants reached a total of 162,000,000 barrels, as compared with 157,000,000 barrels in 1925," said Mr. MacBride. "Actual production in 1926 was 4½ per cent in excess of 1925 and cement producing facilities practically completed will add 10,250,000 barrels to the total.

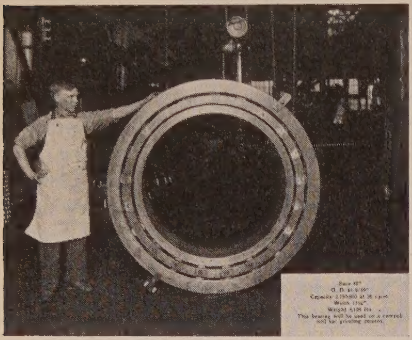
"This indicates a surplus over 1926 consumption of approximately 17,000,000 barrels of cement. In considering the significance of these figures, it should be remembered that a great number of mills in certain sections of the country operated on a curtailed production basis during much of the year due to market conditions. This curtailment was due to the lack of demand."

Mr. MacBride pointed out that one of the things for which investors in cement securities must be watchful is the localized overproduction.

Mill Equipment

Timken Builds Largest Bearing In Its History

The largest bearings ever built by the Timken Roller Bearing Company have just been completed and shipped, according to officials. These bearings have a bore of 42 inches and an outside diameter of 61-9/16 inches. At thirty r.p.m. these bearings have a capacity of 2,750,000 pounds. The weight of each bearing is more than two tons.

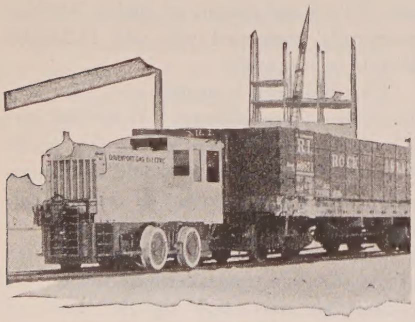


Not only are these bearings the largest ever built in the Timken plant, but they will be installed by the Allis-Chalmers Manufacturing Company in what is said to be the largest compeb mill in the world. This will be put in service in a plant manufacturing portland cement. This mill has a diameter of 10 feet and 9 feet by 45 feet long and is used to take the clinker from the cement kiln and grinding it to finished cement in one machine.

Davenport Develops Gas-Electric Locomotive

In answer to demands for a locomotive with power equal to steam, with the flexibility of steam and elimination of mechanical clutch and gear transmission, the Davenport Locomotive Works, Davenport, Iowa, has developed a gas-electric locomotive that can be handled by anyone. In principle, a generator connected directly to a gasoline engine furnishes electric current for electric motors that are applied to each axle, all the wheels being drivers. Power and speed are regulated through a controller. The chassis frame is assembled in units and parts are individually replaceable in the field. The engine cannot be stalled by sudden overloading and full capacity is always available. Control is centralized, with one hand for control and one for brake lever.

As a portable electric power plant, the engine will develop up to 240 volts.



Driving Unsupported Shafts Through Flexible Couplings

After much discussion pro and con, and although popular opinion rested on the theory that an unsupported shaft could not be successfully driven through flexible couplings, the United Filters Corporation, manufacturers of American Continuous Automatic Filters, have very successfully used Ajax Flexible Couplings for this work for a long time.

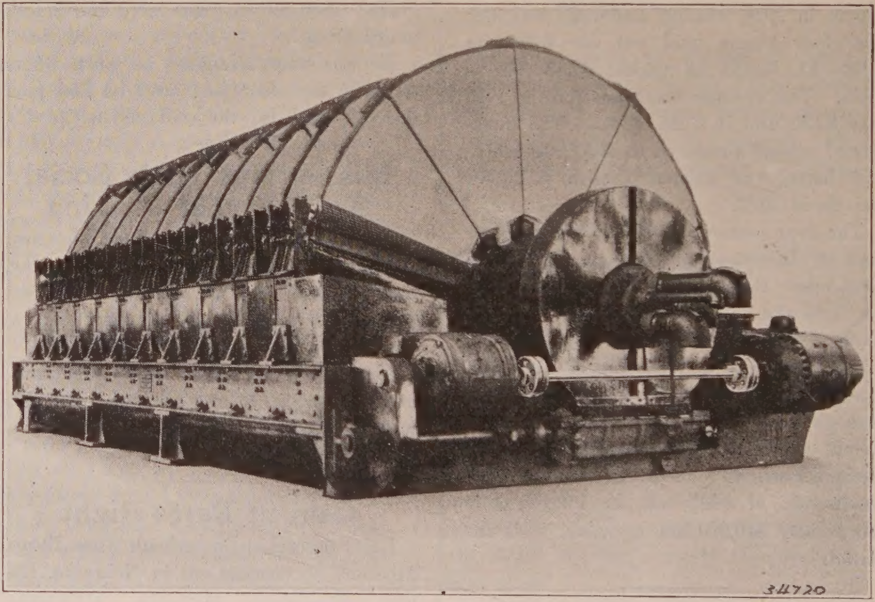
The illustration in this article shows an unsupported drive shaft on the drive end of an American Filter, used for dehydrating cement slurry. The motor, mounted on the right side of the filter, drives a shaft 4 ft. long through an Ajax to an Ajax on the left hand side, which connects with a D. O. James Speed Reducer.

The successful driving of this unsupported shaft is due to the precision-made parts of the coupling. Rubber bumpers, ground to size, perform the double duty of effecting complete insulation and absorbing shocks; the bumpers are firmly cemented around bronze bushings and into holes in the flanges, and are so protected from dirt, oil and water.

Hardened, high-carbon steel pins, or drive-studs are the connecting medium. They are ground to one one-thousandth limits to assure absolute alignment, eliminate friction, and prevent binding and vibrating action. Oilless bronze bushings, impregnated with graphite for self-lubrication, and fitted into the bumpers, furnish a bearing for the steel pins.

The couplings are made on jigs and master dies to assure accuracy and interchangeability of parts. Two halves of a given size coupling guarantee proper fit, even though they are assembled on different units, preparatory to setting up.

The engineers who designed and installed this drive believe its entire success is due to the very accurate precision of the coupling parts.



Bethlehem Steel Company Markets Pulverizer

Low power consumption is one of the features of the "Bethlehem" pulverizer, a product of the Bethlehem Steel Company, Bethlehem, Pennsylvania. Rollers revolve on standard roller bearings, eliminating unnecessary friction, with slow speed, insuring long life of wearing parts. The driving mechanism is readily accessible, and the unit is entirely dustless when properly installed.